

MARINE REVIEW.

VOL. XV.

CLEVELAND, O., MARCH 18, 1897.

No. 12.

Delaying a Settlement of Ore Business.

The ore dealers who were to have met in Cleveland on Tuesday last, and who were quite certain that the leading interests had concluded arrangements that would admit of a pool of all the mines, again postponed their meeting for a week, with the announcement that there was no great hurry about making prices for 1897 and that the interests of everybody concerned would probably be best served by delay. It is understood that no difference of great importance have come up, and that there is every assurance now, as there was ten days ago, of the association being continued, but the condition of the iron industry does not warrant any haste in preparations for the business of the coming year. It is probable, therefore, that on account of the detail work that must follow a general meeting of the ore dealers, no attempt will be made to open up negotiations for the sale of the ore until probably the middle of next month.

In the meantime there is a disposition among vessel owners to go slow in preparations for the opening of navigation. At this time a year ago the engineers, who are put to work three weeks or a month in advance of the opening, were engaged on a large number of vessels in the Chicago fleet, but as yet there is nothing of this kind being done. Even the ore companies that have their own boats have not ordered engineers to work, but it is probable that such orders will be issued in a few cases next week.

Important Move in the Grain Trade.

Although little has been said about Armour & Co. of Chicago being interested in the big steel elevator, for the construction of which contracts have been let in Buffalo, it is absolutely certain that the Armour interest is to control the elevator, and it will be independent of and entirely in opposition to the Buffalo pool. The Chicago elevator people are thoroughly aroused over the diversion of grain traffic to southern routes and southern exporting ports, and the construction of this big elevator at Buffalo is the most important move that has been made in the grain trade of the lakes for a great many years past. The principal elevator interests in Chicago are Armour & Co., Counselman & Co. and an English syndicate, represented by P. B. Weare, which controls a dozen or more large houses. These big concerns own or control practically all of the country elevators throughout the vast territory that sends grain to Chicago. In their fight against the diversion of trade to the south and southeast, as against the central lake route from Chicago to Buffalo and thence by rail or canal to New York, they have had to contend with high transfer charges at Buffalo. Now it is plain that as they own the country elevators and control the business in Chicago their advantage in the competition against southern routes is to be found in having their own elevators also at Buffalo. Their interest is in a through business from the grain fields to the seaboard and from the nature of things they will be opposed to the Buffalo pool. Some interesting developments in the business of handling grain at Buffalo may, therefore, be expected with the completion of the new steel elevator at that point. It is being built on property that has been in possession of the Northern Steamship Co. for a year past, but it is quite certain that the interest of the steamship company, or Mr. J. J. Hill, in the enterprise is not as important as that of the Chicago people. About 7,000 tons of steel for which orders have been placed at Pittsburg, will be used in the new elevator and it will cost about \$400,000.

How Steel Rails Will Help the Ore Business.

Assuming that the purchase of steel rails following the February break in the pool reached an aggregate of 1,000,000 tons, some one at Duluth, said to be a railway manager, has figured that these purchases alone will result in the consumption of 2,184,566 tons of ore, or about one-fourth of last year's production in the entire Lake Superior region. Here are the railway man's figures:

"Not many of us stop to think," he says, "just what is involved in the sale of 1,000,000 tons of rails or how much money it will put

in circulation. One million tons of steel rails, at an average price of \$19 per ton, is \$19,000,000, and if the average weight per yard is say seventy-five pounds, it will lay 8,474 miles of track, and while most of it will be used to replace tracks now in use, but badly worn, it is safe to say, that while some of the old spikes will be used again, about one-third new spikes will be needed, which means that 6,704 tons of spikes must be bought for about \$231,344. It will require 5,965,696 angle bars, weighing about 53,691 tons, and costing not less than \$1,730,051; 11,931,392 track bolts, weighing 5,965 tons, and costing about \$214,740; at least one new frog to each ten miles of track, say 847 frogs, weighing 567 tons, and worth about \$16,940. About one-fourth of this metal will be laid with tie plates, requiring 12,678,000 plates, weighing about 25,356 tons and costing about \$760,680. The average distance from the rail mills to the roads upon which it is to be used will perhaps be 300 miles, upon which a freight charge of about 1 cent per ton per mile must be paid—\$3,276,849. Probably half of it will be transferred en route from cars to boat or boat to cars, at a labor cost of about 20 cents per ton—\$109,228. It is fair to assume that 500 miles of this rail will be used for new road, which will probably cost, to grade, tie and ballast, \$10,000 per mile, \$5,000,000, and to lay the remaining 7,974 miles and pick up the old metal will cost at least \$200 per mile, or \$1,594,800, and probably twice that amount, for no railroad company will lay new metal on poor ties or insufficient ballast, and therefore many new ties and much new ballast must be provided, which will add considerably to the cost.

"So the sale of the 1,000,000 tons of rails, with necessary fastenings, is really a sale of 1,092,283 tons of metal, and as it takes about two tons of iron ore to make a ton of rail, it means that the much abused railroads have in this purchase of rails alone provided for a consumption of 2,184,566 tons of ore, which is equal to more than three-quarters of the total output of the Mesabi range during the season of 1896, and have taken the first and by far the most important step toward the expenditure of \$31,934,632 during the next fifteen or sixteen months, for they are not buying material to pile it up in their store houses and yards, where it simply represents so much idle capital, but to use it about as fast as the mills will be able to furnish it."

Ship Yard Matters.

It is not surprising that the Globe Iron Works Co. of Cleveland was the only ship building concern to submit a bid on the two new revenue cutters, for which proposals were opened in Washington on Monday last. Ship builders on the lakes now understand quite fully the exacting demands of the government in work of this kind, and they understand also that the Globe company lost a large sum of money on the revenue cutter Gresham, which they completed last fall, and in connection with the construction of which a bill of relief, entirely justifiable, is now pending in congress. Then, too, the Globe company on account of having built the Gresham, which is in nearly all respects similar to the new boats, was in a position to give the government two more ships at prices lower than could be made on work that was entirely new. Still the bid of the Cleveland concern is \$198,000 each for the new vessels, which is only \$2,000 less than the appropriation of \$200,000 each for the vessels. But the builders through Assistant Secretary Ireland, who visited Washington, have suggested modifications of the plans that will admit of about \$6,200, instead of \$2,000 being allowed in each case for the expense of plans, supervision of construction, etc.

Vessel owners who have visited Milwaukee recently say that the Milwaukee Dry Dock Co. will be well equipped for repairs of steel vessels shortly after the opening of navigation. The new repair plant which is well under way, will be modern in every particular. A large amount of money has been spent in machinery, all of which will soon be on the ground.

Burger & Burger of Manitowoc are building a fishing tug 50 feet long, with 12 feet beam and 6 feet hold, for Gunderson Bros. of Sheboygan.

Collapse of a Pair of Corrugated Furnaces.

The illustrations on this page represent an accident that recently occurred to one of the four marine boilers of whaleback steamer *City of Everett* on the Pacific coast. They are reproduced from the *Locomotive*, and they show the wonderful amount of deformation that a well made corrugated furnace can undergo without leading to a disastrous explosion. They also convey the lesson that unnecessary complications in valves and piping should be carefully avoided, since they are almost sure to result in trouble some time or other.

The *Everett* is the only vessel of the whaleback type built on the Pacific coast. She was designed by Capt. Alex. McDougall, and was placed in commission in 1894. Her dimensions are 346 feet length, 42 feet 8 inches breadth, and 13 feet 7 inches depth. She has four compound marine boilers, each 132 inches in diameter and 11 feet long. The shells are of steel, 0.938 inch thick, and of 60,000 pounds tensile strength, and the pressure allowed by the government inspectors is 168 pounds per square inch. Each of the four boilers has two corrugated steel furnaces, 40 inches in diameter and 8 feet 6 inches long. The furnace shown in Fig. 1 is from the forward starboard boiler, both furnaces of which were burned and bulged down by blowing the

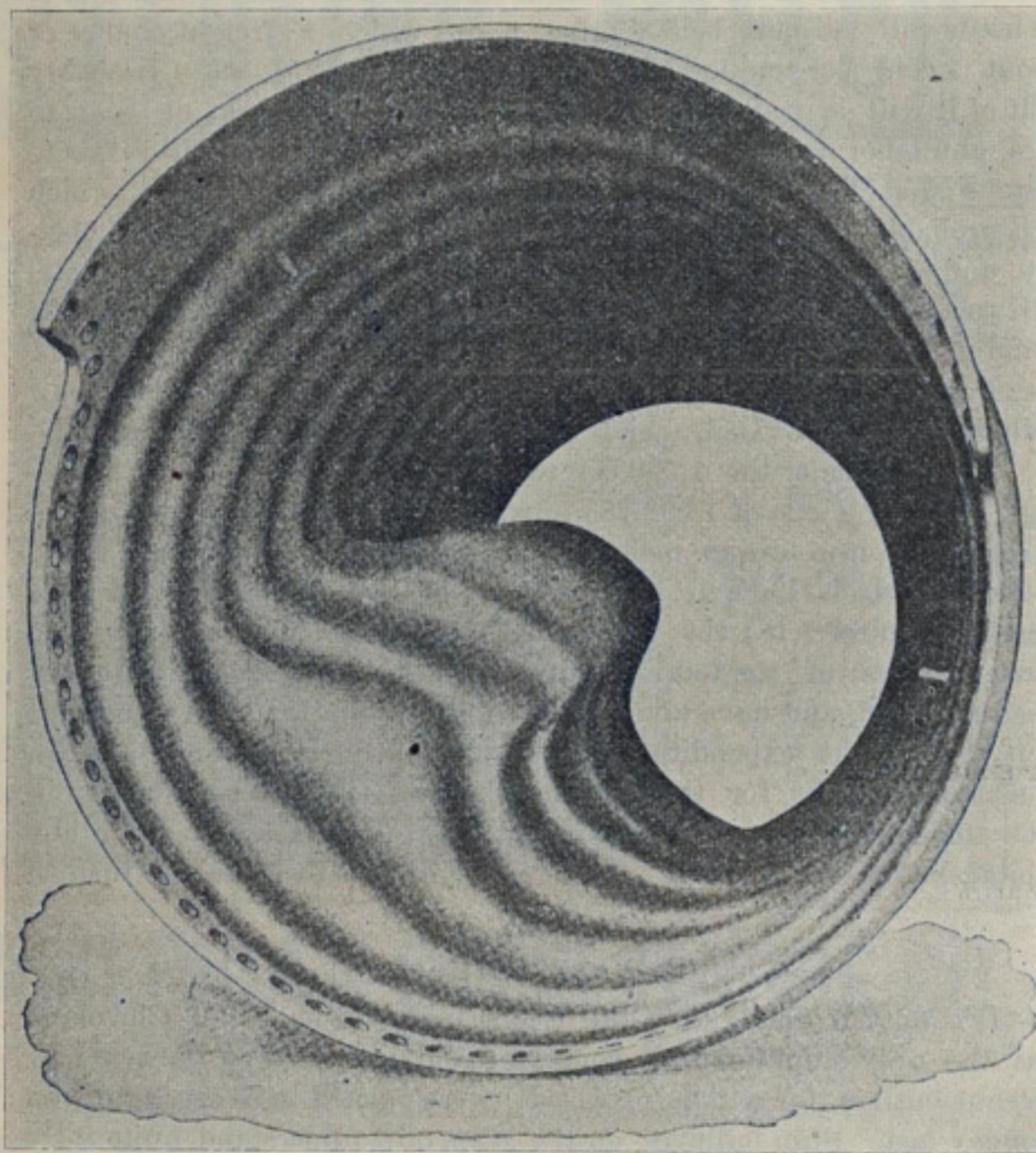


FIG. 1.—BULGED FURNACE.

water out of the boiler while there was a fire in each of them. The blow off pipes from the four boilers are connected into cross, or thwartship, blow pipes, which pass over the tops of the boilers as shown in Fig. 2, and are provided with valves on the port and starboard sides of the vessel. It was this arrangement of the blow pipes that led to the accident under discussion.

It appears that some time after putting out from Victoria, B. C., for San Diego, Cal., with a cargo of coal the engineer in charge ordered the water tender, or fireman, to blow down 3 or 4 inches of water from the forward starboard boiler. In carrying out this order the fireman opened the valve on the front head of the starboard boiler, and also the outboard blow valve on the starboard side. (This will be understood by reference to Fig. 2.) After blowing down as far as desired, the top outward valve was closed. This, of course, stopped the blowing at once, but when the man came down from the ladder he forgot to shut the lower valve, on the head of the boiler. When the steamer reached Port Townsend, one of the breeching bolts on the forward port boiler was found to be leaking, and the chief engineer therefore ordered the pressure to be lowered on that boiler, and that water blown out so that the bolt could be renewed. He also gave orders to wash out the two after boilers, and carry steam only on the forward starboard boiler (the one on the right in Fig. 2.) As the

Everett was to lie at the dock over night, a slow fire was kept under this boiler, the fires under the other three being hauled. When the steam pressure on the three cooling boilers had been reduced to about 20 pounds, orders were given to open the blow off valves attached to them and blown down. This was done, the blow off valve on the front head of the starboard boiler being open all this time although it was supposed to be shut.

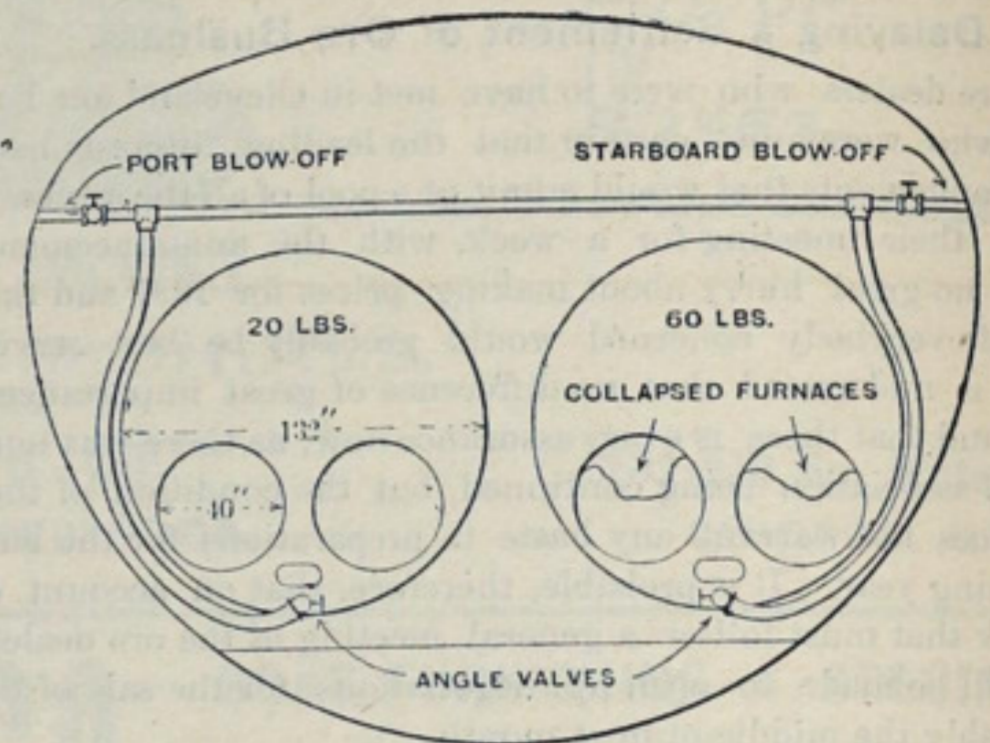


FIG. 2.—CROSS SECTION SHOWING ARRANGEMENT OF BLOW PIPES.

The result hardly needs to be told. The boilers from which the fires had been drawn were under only twenty pounds of steam, while the forward starboard boiler, with a fire in each furnace, was carrying 60 pounds, so that it emptied itself much more rapidly than any of the others. After some little time, one of the firemen opened one of the doors of the forward starboard boiler, and found the furnace red hot and bulged down as shown in the engraving. Upon investigation he found the other furnace in this boiler in the same condition. The fires were at once hauled out, and upon examination it was found that the furnaces were down 21 inches, the corrugation being pulled out so that at the bottom of the bulges the furnace was almost smooth but no signs of fracture could be discovered. If these furnaces had been poorly made, or if they had been constructed of a material deficient in ductility, it is almost certain that a disastrous explosion would have followed the rough usage to which they were subjected, and this fact ought to satisfy any one of the paramount importance in boiler construction of having good material and good workmanship. The folly of giving a fireman too many things to remember will also be apparent, for if each boiler had been provided with its own separate blow pipe, discharging directly into the sea without any connection with the other boilers, this accident could not have happened.

Waverly Salvage Case.

In September, 1893, the freight steamer *Waverly*, bound from Chicago to Buffalo, having two schooners in tow, and 47,000 bushels corn as her own cargo, became disabled on Lake Michigan, by reason of a break in her machinery. The schooners proceeded under sail. The steamer blew signals of distress, and the *Charlevoix*, bound from Northport to Chicago, with passengers and cargo of general merchandise and fruit, came to her assistance. The matter of compensation was left to the owners for settlement. The condition of the weather was not such as to place the *Waverly* in imminent peril from that source, but there was sufficient sea to require care and skill, and involve some extent of risk to the *Charlevoix* in maneuvering to take the line and also in towing the disabled vessel, the wind having increased. The *Waverly* and cargo were valued, by stipulation, at \$67,000, and the *Charlevoix* and cargo at \$75,000. Judge Seaman of the United States district court, Milwaukee, decided that the service was voluntary, but prompt and efficient; it was more than mere towage, but only a minor order of salvage. A tender of \$500 had been refused. The court allowed \$1,500, saying "the purpose of the rule of salvage, which grants compensation in the nature of a reward, would not be fulfilled by narrowing the allowance so closely to the rate of mere towage," and that the amount awarded would be just under the circumstance shown.

The season of painting is at hand and the Joseph Dixon Crucible Co. of Jersey City, N. J., asks everybody who is intending to purchase paint to write for circulars and other information regarding Dixon's silica graphite paint.

A Lake Naval Reserve.

Although the federal government has for some time past shown a disposition to favor naval reserve organizations throughout the country, it is unfortunate that on the lakes especially there has been a lack of interest in the movement among vessel owners and marine men generally, who might be expected to take a leading part in the formation of the different state organizations. Illinois and Michigan have taken advantage of the assistance that has been offered to them by the general government, and the cities of Chicago and Detroit now have a naval militia of fair proportions, but the movement in Ohio has been slow of development, and in the other lake states practically nothing has been done. In Cleveland a few earnest workers have succeeded in forming a division of the Ohio organization, and with a view to assisting their efforts, as well as the efforts of promoters of this movement in other lake states, it may be well to direct the attention of shipping interests to the objects and expectations of the naval reserve institution as a whole.

The United States is the only civilized country on the globe that has not some established system for replenishing its stock of maritime defenders. The popular voice has everywhere approved of measures taken in recent years to place our naval establishment upon a footing equal to that of other maritime powers. But we must have a reserve force from which to man our ships, and more particularly a naval sentiment that will make a rapid and sudden increase of the regular force possible. Each international episode and every domestic evil emphasizes this fact. We have a sea coast of about 10,000 miles, with only a regular naval force of 8,000 men, a great many of whom are foreign born, while such a foreign power as Great Britain, for instance, with all her regular naval force and navy, has a naval reserve amounting in all to 126,000 men. France has 160,000 men. Naval reserves in other European nations are not as large as those of France and England, but they all have a system of replenishing their navies with men in time of need. It is well known, of course, that although we are turning out naval vessels that are equal to the best in the world, it is an impossibility at the present time to get enough American seamen to man them. With this condition in view, the federal government has encouraged the organization of naval reserves in the different states, and on the Atlantic coast, especially in the states of Massachusetts, New York, Rhode Island and Connecticut there are organizations well equipped and of large membership. In North Carolina, Texas, California, Pennsylvania, Washington, Delaware, Oregon and Mississippi the naval reserve movement has also found many earnest supporters. But nowhere probably will these organizations be of greater benefit than on the lakes where the extent of coast line and the value of interests involved are fully equal to those of the Atlantic and Gulf states.

During the last session of the Ohio legislature a law was passed providing for the organization of two battallions of a state naval reserve. One battallion has already been organized, uniformed and equipped, and is now in service in Toledo. The second battallion has been allotted to Cleveland, and the first division of this battallion has been mustered into service and the men are now drilling and waiting for their equipment. A second division is ready to be mustered in as soon as the officers of the present division see that the aid and assistance which they expect will warrant it. The division already in service numbers about seventy-five men. There are, of course, a large number of the men who are not sailors, but all are enthusiastic and willing to learn. Many of them own or are interested in yachts or other small boats, and their experience in this regard will be of some advantage to them. Officers of the division are D. H. Pond, lieutenant; Geo. H. Gibson, lieutenant junior grade, and N. J. Shupe, ensign. They have just received their commissions and are now drilling the men at the Gatling Gun Armory, where they will hold their drills until permanent quarters can be secured afloat. When the second division is organized and mustered into service it will form a full ship's crew which will be commanded by a lieutenant commander, and a staff. It is hoped that some practical vessel man of prominence can be induced to accept this position. The government has made an appropriation this year of \$50,000 for the naval reserve but this is not received in money. It is given to the reserve in arms and equipment. This year it will amount to about \$10 or \$12 per man, which will be sufficient to provide for rifles and cutlasses. From year to year as the appropriations are made and grow larger the men will be supplied with arms of all kinds used in the regular

navy, in which they will be drilled, and the strictest discipline followed.

One of the promoters of the Cleveland division says in a discussion of its plans: "We do not propose to make our organization a show organization but rather an organization for work. We expect to be of immediate assistance to vessel owners and the shipping interests, as we will be subject to call in time of riot or serious labor difficulties. It is our intention to secure, as soon as possible, a suitable boat, to be used for permanent headquarters, and in which also the men could be readily moved if required to points like Lorain, Fairport and Ashtabula. Unfortunately the state legislature, on account of opposition from representatives of the interior counties, who have no interest in lake commerce, made no appropriation for the reserve. But in order to take advantage of last year's government appropriation for equipment we were forced to hurry our organization, and depend upon assistance from those whom we are to serve in securing uniforms and a training vessel. The men have themselves contributed for their working uniform, which will consist of a white canvas suit, but they must be provided later with the full United States seaman's outfit. The vessel should be a three-masted schooner, as nearly square rigged as practicable, and it is the intention to anchor it within the breakwater enclosure. It is hoped that these facts placed before the shipping interests will cause vessel owners and others to come forward with the aid and support that such an organization deserves."

Liability of Brokers.

A case just dismissed in Cleveland by Associate Justice John W. Harlan of the supreme court of the United States, will prove especially interesting to vessel brokers. It is that of Crerar, Clinch & Co. of Chicago against Moore, Bartow & Gilchrist, vessel brokers of Cleveland, growing out of an alleged breach of contract for the transportation of ore. The hearing was before Circuit Judge Ricks of the northern district of Ohio, who, being obliged on account of ill health to take an extended vacation, requested Justice Harlan to dispose of the case. Among other things, the plaintiffs claimed that Moore, Bartow & Gilchrist, after chartering the steamer Elphicke for a cargo of ore at 40 cents, ordered her to take another cargo from Escanaba, agreeing to furnish another vessel of equal capacity for the cargo intended for the Elphicke at the same rate; that they failed and neglected to do this and the plaintiffs were themselves obliged to go into the market and secure tonnage for the cargo. This they did on or about Oct. 24, 1895 (the Elphicke's charter was made about May 1), at a rate calling for \$2,112.50 in excess of the cost of the first charter. The plaintiffs sought to hold the defendants to the liabilities of owner, treating their promise to furnish other tonnage as an original obligation to carry. The defense was made that Moore, Bartow & Gilchrist were brokers; that this was known to plaintiffs, who dealt with them as such; that the failure of the Elphicke to carry was not due to any fault of theirs, and as to furnishing other tonnage, their promise to furnish at a certain rate only bound them to a proper endeavor to do so, and having been duly diligent in that regard, they were not to be held. The case involved several other questions of fact, but was dismissed in defendants' favor on the finding that defendants were brokers; that plaintiffs knew this, and that as brokers defendants had not failed in the performance of any duty resting upon them as such.

An excellent chart of Green bay and approaches, on a large scale, has just been published by the United States Hydrographic office and may be had from the Marine Review. The chart is corrected to March 1, 1897, and takes in with Green bay the west shore of Lake Michigan from Manistique to the Kewaunee. It will be of great value to masters of Lake Michigan trading vessels, as well as the larger ore and coal carriers trading to Escanaba. Soundings are in feet and there is a scale of statute miles attached. The price is \$1.25, but the chart is so complete in detail that it is larger than the single sheet charts of Lake Superior or Lake Michigan.

Ex-Representative J. M. Farquhar of Buffalo is one of several prominent Republicans who are anxious to succeed Mr. E. T. Chamberlain as commissioner of navigation. Major Farquhar was the first chairman of the committee on merchant marine and fisheries of the house, and was the author of the bill which provided for a commissioner of navigation.

Around the Lakes.

On the opening of navigation the fixed white lens-lantern light, about 1,000 feet south of the front light of the Maumee bay range lights, Toledo, will be discontinued.

The steamer W. R. Stafford, with the schooners Ed McWilliams and John A. Francombe, have been chartered by the Tonawanda Iron & Steel Co. for the coming season.

The Marquette Towing Company announces to its patrons and friends that they will have the tugs Edward Gillen and Calumet stationed at Marquette during the season of 1897.

Capt. Andrew Robertson, a well known lake captain and father of Morgan Robertson, the writer of nautical stories, died Tuesday at Oswego, N.Y., after a prolonged illness. He was eighty years old.

The fight of the Detroit & Cleveland and the Grummond lines for business between Detroit and Cleveland has finally resulted in the D. & C. Co. reducing its rate on freight of all classes to the nominal figure of 1 cent per 100 pounds.

Geo. C. Williams has been appointed to succeed the late Hugh McMillan in charge of the Western Transit Co.'s business at Chicago. Mr. Williams has been connected with the company for a number of years. He is a son of Capt. Frank Williams of Buffalo.

It is understood that Mr. John Gordon, who has just chartered the steel steamer John W. Moore for package freight business next season, will also have three or four other vessels under charter, as a result of advantageous arrangements which he has made for railway connections at Lake Erie ports.

Another steamboat fuel dock, equipped with pockets and chutes, as well as McMyler rotary derricks, will be in operation on the Sault river next season. Officers of the Inter-Ocean Coal & Coke Co. of Cleveland have given up interest in the Detour dock, with which they were connected last season, and have acquired the lease of about 490 feet of dockage at the Sault, just below the canal. Improvements in the new property will involve an expenditure of several thousand dollars.

Officers of the D. & C. Co.'s steamers report that the wreck of the steamer Grand Traverse, which was sunk in Lake Erie in collision with the steamer Livingston last season, is now nearly due north of Colchester, and right in the course of vessels bound to and from the Detroit river. The ice has carried away the vessels spars and the obstruction is therefore more dangerous than ever. It is probable that the Canadian government will take steps to remove the vessel.

Major Clinton B. Sears, United States engineer at Duluth, opened proposals, Monday, for a pier extension at Grand Marais, Minn. The proposed expenditure is about \$14,000. A. & D. Lang of Duluth were the lowest bidders. Other bidders were Joseph A. Beauvais, and Estow & Munroe of Charlevoix, Mich., Heldmaier & New of Chicago, Green & Anderson of Green Bay, Alex. McCurdy of Duluth, Wm. McCurdy of Houghton, Mich., A. J. Dupuis & Wm. M. Blay of Detroit, Lippett & Gregg of Sault Ste. Marie, Mich., Powell & Mitchell of Marquette, Mich., and Geo. Cooper of Manitowoc, Wis.

H. C. Burrell of Lorain, who has for some time past been engaged in preparations to begin a marine reporting business at Detroit, has completed his plans and will have men on the river at the foot of Woodward avenue at the opening of navigation. He has secured quarters in the Brady building on the west side of the Woodward avenue river front where the Belle Isle ferries land. He promises a first-class service for the full season, whether a profit is to be had at the work or not. One advantage with which he begins work is a contract from the Lake Marine News Association to furnish news and vessel passages to all of the daily newspapers on the lakes.

There are a number of ways in which Wells lights are used on the lakes. They have proved valuable in straightening bent plates in the bottom of steel vessels when in dock for repairs. The plates are heated and straightened without being removed from the vessel. The lights have been used on the decks of vessels while unloading and for use on docks they give perfect satisfaction. The following letter is from the Erie Coal Transfer Co., Cleveland: "We used two of the Wells lights last season on our coal loading dock in Cleveland, and they furnished sufficient light in all kinds of weather for the loading of vessels. We can recommend them for this use." Full particulars and prices may be obtained from the Wells Light Mfg. Co., 46 Washington street, New York.

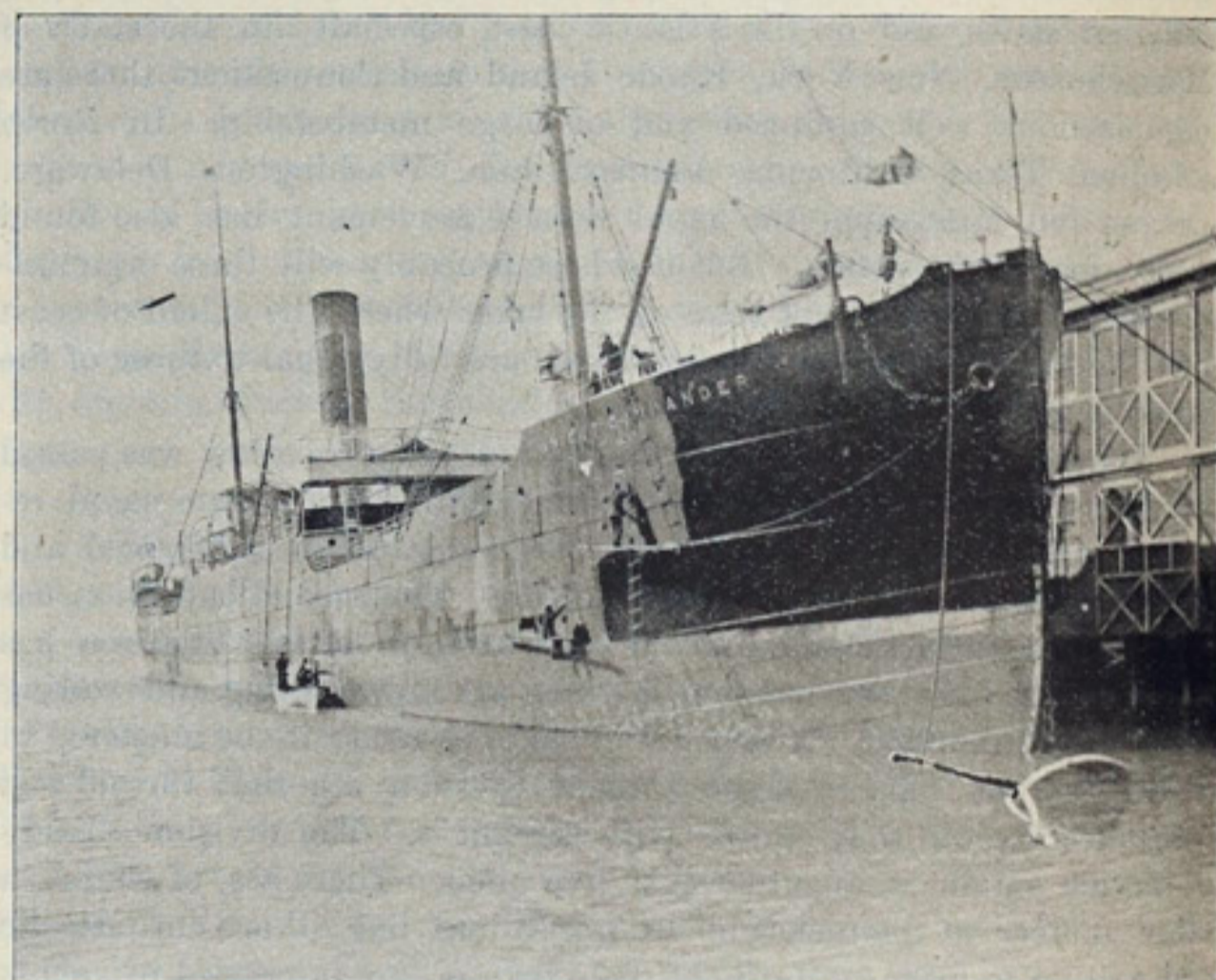
A Candidate for the Commissionership.

Frank A. Flower, who has for years been an officer or leading delegate to every deep waterway convention held in this country, is understood to be a candidate for the office of commissioner of navigation. Mr. Flower is certainly peculiarly fitted for this office. He is thoroughly posted in everything pertaining to the shipping interests of the country and especially internal commerce. He will find a great many supporters among business men in the northwest, who are enthusiasts on the subject of cheap water transportation from the head of the lakes to the Atlantic seaboard. Although his candidacy has not been publicly announced, the Review is in receipt of two or three letters asking that support be given to him. One of these correspondents says:

"The commissionership is not much of an office but its duties and possibilities are in line with the work Mr. Flower has been doing at private expense for years. His knowledge of all the details connected with such problems as the big river and harbor improvements, the question of lake levels, impounding of lake waters, Chicago canal and many other subjects that have an important bearing on water transportation would certainly result in bringing these matters more fully to the attention of congress. Why is it not time, anyhow, that the lake carriers and the lake ship builders should have in that office for once some one who is in sympathy with their interests; who tries to understand and promote their welfare; who will meet and keep in touch with them; who is not carried away with the free-ship notion; who has no artificial load-line fads; who will help watch congressional action and actively promote that which is calculated to benefit water transportation and water interests? Mr. Flower is capable of marking out and carrying into effect in this office a plan of work that will be of living interest and real benefit to the great enterprises involved and to the people generally."

A Tramp Steamer.

The illustration shows the Knight Commander an English tramp steamer at a warehouse dock in Newport News, Va., taking on a cargo of general merchandise, and receiving a coat of paint. This vessel



carries about 5,000 tons and burns thirty-four tons of coal per day, so that her fuel consumption is about equal to some of the larger class of lake steamers. When in Newport News she carried a coolie crew, and it was noted that two coolies are required to one Englishman. The photograph was made by two modest lake captains who visited several coast ports during the winter. As they are not seeking honors as amateur photographers, their names are not given, but it may be noted that one of them sailed the Sauber last season and goes into the Bessemer fleet this season, and the other sails the Nicholas.

A chart of the whole of Georgian bay, the best thing of its kind as yet published, has recently been issued by the British admiralty, and may be had from the Marine Review, No. 409 Perry-Payne building. Another chart, of a very clear and interesting kind, taking in Lake Huron, Georgian bay, Lake Erie and connecting channels, has also been issued recently by the same authority.

Appointments of Captains and Engineers.

Loutit, W. H., Grand Haven, Mich.: Steamer—Pentland, Capt. Thos. McCambridge, Engineer C. Ball.

Buckley, Edward, Manistee, Mich.: Steamer—Edward Buckley, Capt. Chas. Gneuwuch, Engineer Richard Winkler.

McMorran, Henry, Port Huron, Mich.: Steamer—Mary Groh, Capt. Chas. Diefenbach, Engineer DeWitt Stevens.

McCormick, H. W., Bay City, Mich.: Steamer—Katahdin, Capt. John Sterling, Engineer ——. Schooner—Oneonta, Capt. M. J. Shean.

Botsford, Wm. F., Port Huron, Mich.: Steamers—Colorado, Capt. Jno. McLean, Engineer Thos. Birch; Osceola, Capt. Jno. McLeod, Engineer Thos. Morrill.

Jenkins, John, Marine City, Mich.: Steamer—W. H. Sawyer, Capt. John Jenkins, Engineer Nelson Goulette. Schooners—C. E. Redfern, Capt. Wyman Powers; A. C. Tuxbury, Capt. John Jones.

Curtis & Brainard, Toledo, O.: Steamers—Cherokee, Capt. W. A. Ashley; Mohegan, Capt. Wm. Hagan; Miami, Capt. J. A. Ward. Schooners—Chippewa, Capt. John Davidson; Mingoe, Capt. A. Snelgrove.

Marine Transit Co., Marine City, Mich.: Steamers—Aztec, Capt. J. W. Baby, Engineer Amos Horton; Toltec, Capt. Jas. Taylor, Engineer C. G. Pierce. Schooners—Zapotec, Capt. Peter Thompson; Miztec, Capt. H. S. Skackett.

Canadian Pacific Steamship Co., Owen Sound, Ont.: Steamers—Manitoba, Capt. E. B. Anderson, Engineer Robt. Kenny; Athabasca, Capt. Geo. McDougall, Engineer Wm. Lockerbie, Alberta, Capt. Jas. McAllister, Engineer A. Cameron.

Hope, Transportation Co., John A. Francombe, Manager, Detroit: Steamer—W. R. Stafford, Capt. Eugene Rathburn, Engineer J. A. Francombe. Schooners—Ed. McWilliams, Capt. George Johnson; John A. Francombe, Capt. Andrew Christenson.

Wallace, David, Lorain, O.: Steamers—Vega, Capt. W. H. Wallace, Engineer A. N. McDonald; Vulcan, Capt. A. Oldorf, Engineer John McMonagle; Robt. Wallace, Capt. J. Smith, Engineer Chas. McPhail. Schooner—David Wallace, Capt. T. Ingram.

McBrier, James, Erie, Pa.: Steamers—Fedora, Capt. F. A. Fick, Engineer John Stephens; Nyanza, Capt. W. W. Wilkins, Engineer J. R. Blanchett; Uganda, Capt. C. H. Wilson, Engineer Chas. R. Ogg; Sarona, Capt. D. S. MacDonald, Engineer William Meade.

Saginaw (Mich.) Vessels: Steamers—E. F. Gould, Capt. Chas. Van Norman, Engineer Amandus G. Moll; J. E. Thew, Capt. John Gerry, Engineer Joseph Huber; W. Browne, Capt. J. W. Jones, Engineer Wm. Spaulding; Chas. H. Davis, Capt. E. W. Haskin, Engineer Joseph D. Budd.

Parker & Millen, Detroit: Steamer—City of Toledo, Capt. George King, Engineer Daniel Harkins; Greyhound, Capt. Bert Baker, Engineer Robert Meddler; B. W. Blanchard, Capt. Thomas Meikleham, Engineer John Bloome; Favorite, Capt. P. L. Millen, Engineer Geo. L. Simmons. Appointments for tugs not complete.

Moore, John W., Cleveland, O.: Steamers—J. W. Moore, Capt. Richard Neville, Engineer Levi Walder; Siberia, Capt. R. C. Pringle, Engineer Michael Hughes; Marquette, Capt. E. D. Chilson, Engineer F. O. Burrows; Colonial, Capt. J. H. Stover, Engineer Geo. Masters; Louisiana, Capt. Truman Moore, Engineer Elmer Ennis.

Parker, A. A., Detroit: Steamers—A. A. Parker, Capt. J. T. Hutton, Engineer James Falconer; John Oades, Capt. Timese Lemay, Engineer Charles Scott; John Pridgeon, Jr., Capt. D. N. Sherwood, Engineer John Morgan. Schooners—B. W. Parker, Capt. Edward Lohr; Red Wing, Capt. John Anderson; San Diego, Capt. John Mason; Saveland, Capt. Henry Morey.

Millen, Jas. W., Detroit: Steamers—Iron King, Capt. Wm. F. Millen, Engineer John Hegemer; Iron Chief, Capt. W. A. Irvine, Engineer August Cobo; Iron Duke, Capt. N. L. Miner, Engineer Christ Howard; Iron Age, Capt. A. J. Mahon, Engineer John Phelan. Schooners—Iron Queen, Capt. Wells Bamford; Iron Cliff, Capt. Thos. Fitzsimmons; Iron State, Capt. W. W. Carter; Iron City, Capt. John Hurley.

Union Steamboat Co., Buffalo: Steamers—Ramapo, Capt. W. Robinson, Engineer R. Hill; Chemung, Capt. F. B. Huyck, Engineer George Fritsche; Owego, Capt. John Byrne, Engineer C. W. Wall; Tioga, Capt. John Wulke, Engineer Charles Coughane; H. J. Jewett, Capt. Joseph Frawley; Engineer Joseph Howlett; Rochester, Capt. J. H. McDonald, Engineer Nelson Johnson; New York, Cap. John Dugan, Engineer John Caul.

Union Transit Co., Henry C. French, Manager, Buffalo: Steamers—J. V. Moran, Capt. D. O. Bordeaux, Engineer J. H. Countryman; John M. Nicol, Capt. William McLean; Engineer G. E. Tretchway; W. H. Stevens, Capt. John H. Malloy, Engineer J. E. McSweeney; Ward, Capt. M. G. McIntosh, Engineer, J. R. Rudge; James Fisk, Jr., Capt. John L.

McIntosh, Engineer F. F. Sherwood; Portage, Capt. S. E. Chatterton, Engineer George Haig.

Inter-Ocean Transportation Co., David Vance & Co., Managers, Milwaukee: Steamers—Maryland, Capt. J. E. Yax, Engineer M. Conley; Manchester, Capt. T. Kelley, Engineer Jas. Grant; Manhattan, Capt. H. F. Loftus, Engineer W. R. Patterson; Merrimac, Capt. Matt Smith, Engineer Louis Allison; Massachusetts, Capt. Peter Anderson, Engineer Wm. Ahem; Minnesota, Capt. Berlin Sniffin, Engineer Wm. Pinkham, Schooner—Metacomet—Capt. Warren Shields.

Minch and Nicholas transportation companies, Cleveland: Steamers—I. W. Nicholas, Capt. Wm. Gerlach, Engineer William Miller; Onoko, Capt. W. H. Johnson, Engineer A. G. Boland; Philip Minch, Capt. William Young, Engineer Andrew Nelson; H. A. Tuttle, Capt. Cornelius Young, Engineer Wm. E. Donovan; John N. Glidden, Capt. Joseph Lampoh, Engineer William Lawrence. Schooners—Aberdeen, Capt. Frank Coles; Dundee, Capt. Horace Fisher; Sophia Minch, Capt. Anthony Loland; G. H. Warmington, Capt. Patrick Young.

A New Feature in Trade Paper Advertising.

An advertisement in this issue of the Review from one of the largest steamship lines on the lakes, asking manufacturers and wholesale dealers for catalogues, prices and discounts, will no doubt attract considerable attention. It is probably the first advertisement of the kind ever published, but it would seem that the method which it suggests will be followed by other concerns. This advertisement shows, contrary to what some people might expect, that the policy of some of the largest corporations is to give consideration at all times to all business propositions submitted to them, no matter how humble the source, but provided, of course, that such propositions are in business form.

Not long ago a large company operating lake ships was about to purchase considerable machinery. They took the Review and mailed specifications to all concerns advertising machinery of the kind which they were about to purchase. A machinery concern located in the same city as the purchasers, only a few blocks apart, were not asked for a bid. They did not advertise and they were overlooked.

In addition to three new advertisements in this issue, three inquiries were received within a half hour, Wednesday, for space in the Review, one by telephone for a half page for a year, one by telegraph for a price on a third, half or full page for six months, and another for a half page one issue. The Review has at present four pages more advertising than any other marine paper, and at the present rate will soon have to increase its size. New advertising always indicates general business improvement.

A Fast Steam Yacht.

The fast steel steam yacht Marietta, which will soon be launched by the Erie Basin Dry Dock Co. of Brooklyn, N. Y., for Harrison B. Moore, will be one of the finest vessels of her kind afloat and is expected to attain a speed, with forced draft on the enclosed fire-room system, of 23 miles an hour. The Review is indebted to the Roberts Safety Water Tube Boiler Co. for a description of this vessel. Her length over all will be 172.5 feet; beam, moulded, 18 feet; depth, amidships, 10 feet; displacement, 125 tons at a draught of 5 feet 7.5 inches. There will be one short deck house forward, two hollow masts for steadying sails and one smoke pipe. The engine is of the four cylinder, triple expansion type and is building by Mr. J. W. Sullivan, New York. The cylinders will be 14, 21.5 and (2) 25 inches in diameter, and the stroke 18 inches. The designed I. H. P. is 1,000 at 300 revolutions per minute, and a working pressure in the boilers of 250 pounds per square inch. The engine will be forward of the boilers, the shaft running between the boilers. There will be two Roberts water tube boilers, placed side by side. Each boiler will be approximately 6 feet 3 inches wide, 9 feet 9 inches long and 6 feet 8 inches high, exclusive of the depth of the ash pan. The latter will probably be built to fit the frames of the vessel. The total grate surface will be 80, and the heating surface about 2,700 square feet. The estimated weight of the two boilers will be about 26,000 pounds.

Mr. Moore had a pair of Roberts boilers in Marietta I, which made 19 miles an hour, and a pair of boilers of the same type in his Marietta II, for which a speed of 21 miles an hour was claimed. This makes the fourth yacht in which he has used Roberts boilers.

Fire commissioners of Duluth are preparing for the construction of a fire boat. They have been examining the Milwaukee fire boat August F. Jansen, which was built by Rieboldt, Wolter & Co.



DEVOTED TO LAKE MARINE AND KINDRED INTERESTS.

Published every Thursday at No. 409 Perry-Payne building, Cleveland, Ohio,
by John M. Mulrooney and F. M. Barton.

SUBSCRIPTION—\$2.00 per year in advance. Single copies 10 cents each. Convenient
binders sent, post paid, \$1.00. Advertising rates on application.

Entered at Cleveland Post Office as Second class Mail Matter.

The books of the United States treasury department on June 30, 1896, contained the names of 3,333 vessels, of 1,324,067.58 gross tons register in the lake trade. The number of steam vessels of 1,000 gross tons, and over that amount, on the lakes on June 30, 1896, was 383 and their aggregate gross tonnage 711,034.28; the number of vessels of this class owned in all other parts of the country on the same date was 315 and their tonnage 685,204.55, so that more than half of the best steamships in all the United States are owned on the lakes. The classification of the entire lake fleet on June 30, 1896, was as follows:

	Number.	Gross Tonnage.
Steam vessels.....	1,792	924,630.51
Sailing vessels and barges.....	1,125	354,327.60
Canal boats.....	416	45,109.47
Total.....	3,333	1,324,067.58

The gross registered tonnage of the vessels built on the lakes during the past six years, according to the reports of the United States commissioner of navigation, is as follows:

Year ending June 30, 1891.....	204	111,856.45
" " " 1892.....	169	45,968.98
" " " 1893.....	175	99,271.24
" " " 1894.....	106	41,984.61
" " " 1895.....	93	36,352.70
" " " 1896.....	117	108,782.38
Total.....	864	444,216.36

ST. MARY'S FALLS AND SUEZ CANAL TRAFFIC. (From Official Reports of Canal Officers.)

	St. Mary's Falls Canal.			Suez Canal.		
	1895*	1894	1893	1895	1894	1893
No. vessel passages.....	17,956	14,491	11,008	3,434	3,352	3,341
Tonnage, net registered.....	16,806,781	13,110,366	9,849,754	8,448,383	8,039,175	7,659,068
Days of navigation.....	231	234	219	365	365	365

* 1895 figures include traffic of Canadian canal at Sault Ste. Marie, which was about 1/2 per cent. of the whole, but largely in American vessels.

Some of the Canadian newspapers have been engaged in a controversy over an order in council directing the use in all Canadian waters of the international rules of the road, which have resulted from the various conferences held during several years past by representatives of the leading maritime nations. The Citizen of Ottawa has the correct view of this matter as it relates to the lakes. It is, of course, well understood here that the United States did not intend to have the international code of signals for the prevention of collisions apply in any way to the lakes. The rules governing lake navigation in this regard are contained in the White law, which was passed early in 1895, and which is entirely satisfactory to all lake interests. This law was prepared especially for the lakes when it was found that the international rules could not be applied to the peculiar conditions governing lake navigation. It is to be hoped, therefore, that the Dominion government will take steps immediately to have its rules for lake navigation conform to the special law that has been in force with vessels of the United States on the lakes for two years past. Although the recent order in council has caused a misunderstanding, it is quite certain that the heads of the Canadian marine department may be depended upon to handle this matter in the proper manner. As all owners of lake vessels in the United States are fully satisfied with the White law, and as fully 90 per cent. of the tonnage is owned in the United States, it is quite probable that the Dominion officials will, in view of the necessity of uniform regulations, adopt rules similar to those contained in the White law for their vessels on the lakes.

It is expected that the Canadian Deep Waterways Commission, which is composed of Messrs. Howland, Keefer and Munro, will ask the Dominion government, in its report to be submitted to parliament shortly, for an appropriation of \$15,000, to be used for surveys and examinations of a kind similar to those for which the United States government is about to appropriate \$150,000. The great difference in appropriations for these surveys of ship-canal routes from the lakes to the Atlantic seaboard is due to the fact that work of this kind required in Canada is much less than is required in the United States.

Engineering of London has been devoting several pages each week for several weeks past to a description of the Chicago drainage canal and machinery used in its construction. The illustrations are all of an excellent kind.

Steel Works at the Head of the Lakes.

On the claim that the tendency in the iron industry is to establish manufacturing plants near the ore, O. H. Simonds of Duluth, Minn., advances some very strong arguments in favor of that city as an advantageous point for a steel plant. Mr. Simonds refers to the concentration of the various steps of manufacture under one management, from the mining of the ore to the delivery of the finished product. He also directs attention to changes in manufacture that have lessened the fuel consumption until the quantity required is little more than one ton of coal converted into coke, per ton of steel, while the ore is a fixed quantity, about two tons per ton of product. On the claim that these changes must eventually result to the advantage of places like Duluth, Mr. Simonds writes Bradstreets as follows:

"Any one who may be looking for an advantageous location will find that, for a steel plant doing a business of 50,000 to 75,000 tons annually, Duluth possesses unusual attractions. I will briefly refer to some of the conditions at that point bearing on this trade. Saint Louis county, Minnesota, of which Duluth is the principal city, contains within its borders the Vermillion range, with an ascertained ore deposit of 100,000,000 tons, and the Mesabi range, with a known deposit of over 300,000,000 tons. The ores of both these ranges pass Duluth on their way to Cleveland and Chicago, and, taken together, are of such quality and variety as to make good Bessemer or non-Bessemer pig without other mixtures. Bessemer ores can be unloaded in Duluth at \$1.40 per ton on the present rail tariff of 80 cents, and non-Bessemer at \$1.25 per ton, and under some circumstances, for less money. Limestone from Kelley's island is put on Duluth docks at \$1.20 per ton, as against 80 cents at Cleveland. Assuming coke to leave Connellsville at \$1.40 per ton, it would be \$1.95 at Pittsburgh, \$2.80 at Cleveland, and \$3.50 on the furnace dock in Duluth. The shipment to Duluth is by lake and rail, and full allowance is made for wastage and cost of handling in stating the price. These figures are based on actual transactions, details of which can be produced.

"Whenever the use of retort coke ovens becomes commercially settled in this country, these fuel prices can no doubt be reduced, and, owing to local demand for gas and for tar by works engaged in manufacturing its products for local and western shipment, Duluth will be a specially advantageous point for the operation of such ovens. Ammonia will find a ready market in Detroit. In competition with Chicago the territory between Lake Superior and the Rocky mountains is divided roughly by a line from Duluth to Omaha, which is a common point. To the north of this line freights are more favorable to Duluth, and south of it to Chicago. This territory tributary to Duluth contains 4,000,000 people, and is being rapidly built up and developed. Based on the experience of the past three years the annual demand in this region for plates, structural material, wire, barb wire, wire nails, bars and other coarse iron and steel products is something like 150,000 tons, and the local demand for pig iron is about 30,000 tons annually. Works at Duluth would have an advantage in freights over Chicago of \$1.00 to \$2.00 per ton, and some what more over Pittsburgh. With a business well established this favorable differential could no doubt be increased. With three competitive lines to the Pacific coast no doubt large shipments of wire and wire rod could be made to Everett and other coast points and thence to China and Japan.

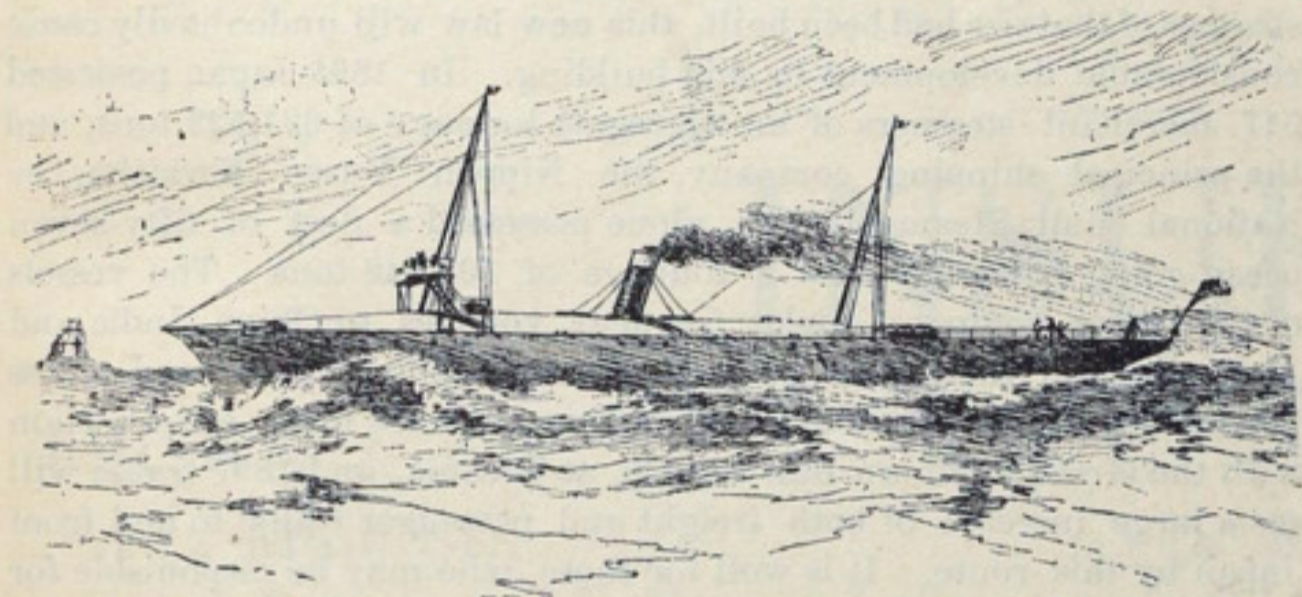
"In organizing a steel plant advantage could be taken of a blast furnace now built with a capacity of 50,000 tons per annum and having around it an ample site for large works, with rail and dockage connections, and also a new steel plant adapted to the manufacturing of steel plate and structural steel. To the above would need to be added a modern open-hearth furnace, with blooming mill for billets, wire-rod mill and wire-drawing works, and nail and barb-wire works. Both Bessemer and non-Bessemer pig iron can be made at a less cost at Duluth than at Chicago, Cleveland or Pittsburgh, and when freight on the product from the points named to Duluth is added, its advantage as a place to manufacture goods for western consumption is very marked, and alone amounts to a good profit. If desired, the fee of good mines on the Mesabi range could be purchased on a basis of 3 cents per ton of ore, or leased without bonus for a royalty of 20 cents per ton for Bessemer and 5 cents for non-Bessemer ores. A plant at the head of Lake Superior would embody every modern advantage and improvement, beside having a growing and substantially exclusive market."

The Review has excellent photographs of lake ships.

Turbine Engines in a Torpedo Boat.

English trade journals contain extended accounts of the performance of the *Turbinia*, a British torpedo boat which recently attained a speed of 29.6 knots over the measured mile and which is driven by a turbine. In dimensions and appearance the vessel is similar to other first class torpedo boats of the British service. She is 100 feet over all and 9 feet beam, and has a displacement of forty-two tons. The *Newcastle Chronicle* says of the craft:

"One is struck at first glance by the compactness of all her fittings. In a torpedo boat of the ordinary type everything is sacri-



ficed to engine space, and the machinery contributes most largely to the weight, but the engines of the *Turbinia* weigh only four and a half tons. They are right at the bottom of the vessel, against the skin. The advantages of this are obvious, especially in a war boat. It gives greater steadiness and obviates destruction of the machinery by an unwelcome shot. The total weight of the machinery including the boiler and condensers, is believed to be not more than two-thirds of that of machinery of equal power of the ordinary kind and of the lightest manufacture. There is only one water tube boiler, which has 1,100 square feet of heating surface and 42 square feet of grate surface, with the furnaces fired fore and aft from two closed stokeholds. Forced draft is obtained from a fan driven off the main engine. It is claimed that the turbine engines allow for a total expansion of the steam of 100 fold, instead of sixteen fold, as is usual in triple expansion engines of the ordinary kind, and that in the case of some recent tests of condensing turbine engines of 200 horse power, applied to driving dynamos, a steam consumption of less than 14 pounds per indicated horse power had been recorded, with a boiler pressure of 80 pounds per square inch, and that it was believed in the engines of the *Turbinia*, developing many times this power, a greater rate of economy than this figure was realized. The boiler pressure in the case of the *Turbinia* is 225 pounds per square inch, and the pressure at the turbines is 150 pounds. Lightness of machinery will permit of parts being carried in duplicate, which is, of course, a great advantage.

"Among advantages claimed for this system of propulsion are increased speed, increased carrying power of the vessel, increased economy in steam consumption, increased facilities for navigating shallow waters, reduced initial cost, reduced weight of machinery, reduced cost of attendance on machinery, diminished cost of up-keep of machinery, largely reduced vibration, and reduced size and weight of screw propeller and shafting. The motor is the invention of Mr. Charles A. Parsons, whose compound steam turbine is well known. Its novelty now is in its application to the propulsion of a vessel. The turbine, in its elementary form, is exceedingly simple, but the engine designed by Mr. Parsons is a complicated and beautiful piece of mechanism. It is, in effect, a series of wheels, fixed and parallel, multiplying thousands of times the driving power of a single wheel. It consists essentially of two parts—first, an outer cylindrical casing, which is fixed, and an inner barrel, which is in effect a broad wheel, in motion, and has the propeller shaft running through it longitudinally. Projecting from the inner surface of the outer casing are parallel sets of fixed vanes, called guiding blades, and from the circumference of the barrel or wheel are sets of blades, the former directing the motion of the steam toward the latter. In order to avoid shock in the diversion of the energy from the guiding blades to the moving blades, and to reduce the residual velocity of the power leaving the wheel, the parallel flow was adopted in the compound steam turbine, in preference to what is known as the outward and inward flow. The guide blades are cut on the internal periphery of brass rings, which are afterwards cut in halves and held in the cylinder by feathers. The moving

blades are cut in the periphery of brass rings, which are afterward threaded and feathered onto the steel shaft and retained there by the end rings, which form nuts screwed onto the spindle. The spindle and its rings rotate together in bearings. Steam is admitted at the inlet, flows to the right of the spindle and passes along to the left, first through the guiding blades, by which it is thrown upon the moving blades. Then it goes on to the next guiding blades, and is by them projected against the corresponding moving blades and so on through the whole series, escaping at the end of the cylinder by an exhaust pipe. In the compound turbine the velocity of the blades is sufficient to secure a very high return of useful effect. Each turbine gives an efficiency of at least 80 per cent. As each turbine discharges without check into the next, the residual energy, after leaving the moving blades, is not lost, as in the case of the water turbine, but continues to the next guiding blades, and is wholly utilized in assisting the flow. A new factor in marine propulsion is introduced by the propeller being driven at the enormous rate of 2,400 revolutions per minute, the highest rate up to the present being about 700 revolutions per minute, thus enabling both the shafting and propeller to be reduced accordingly."

A Ton of Cargo 30 miles on One Pound of Coal.

In view of the attention that has been given of late to the question of adopting artificial systems of draft for lake freight steamers, it may be interesting to note that some of the best ship building concerns of England, among them Sir Wm. Gray & Co. of West Hartlepool, make reports in English trade journals showing that in several vessels which they have built, the Howden hot draft gives 13 to 14 per cent. more steam per pound of fuel than they were able to secure with natural draft. The *Afghanistan*, a vessel recently built by this firm and engined at their Central Marine Engine Works, carries 5,700 tons merchant's measurement, or about 4,000 tons dead weight, at 9½ knots on 14 tons of coal per day. If the speed is made 10 knots, a standard for comparison, the result is one pound of coal moving a ton of cargo thirty miles. Dimensions of the vessel are 306 by 43 by 21 feet, and the engines are triple expansion with cylinders 23, 36½ and 62 inches diameter by 39 inches stroke, the working boiler pressure being 160 pounds. The builders, who have constructed a large number of vessels of this kind with and without artificial draft appliances, and who have had a great deal of experience with the Howden draft, claim that there is a gain of boiler weight in this vessel of fifty tons, as only one boiler, 15 feet 6 inches diameter by 11 feet 6 inches length is required, as against two that would be required without the draft. They claim also that while reducing the weight there is no curtailment of the efficiency-making proportions of the one boiler, for it gives as much heating surface per foot of fire-grate as it was formerly customary to give to twice that area of grate. There is 2,920 feet of heating surface for 62 square feet of grate. This is in the boiler proper, in addition to the Howden heating surface, which pick up the truant heat of the smoke, 47 square feet of heating surface per foot of grate, or 2 square feet per pound of fuel per hour.

Success attained by this firm of builders in the use of the Howden system is made up largely, it is claimed, by careful attention to the most minute details and by perfect workmanship. All the smoke-box doors and the furnace doors are hermetically jointed with asbestos tape. There are valves on the furnace doors for regulating the admission of air above or below the bars in such proportions as to produce the most perfect combustion, as seen by looking through a small pane of mica which is fitted in the door. The side fire-bars are jointed close to the sides of the furnaces to prevent active combustion in contact with the plate which is so productive of pitting. Beneath the boiler there is no water ballast tank in the vessel, because the tops of tanks under boilers deteriorate very rapidly, owing to the heat from the boiler. There are the ordinary floors and strong stringer plates instead.

Edwin H. Whitney, member of the American Society of Mechanical Engineers and the Society of Naval Architects and Marine Engineers, is now the chief engineer of the Marine Machine & Conveyor Co., 111 Broadway, New York. This concern owns patents and is engaged in the manufacture of coal handling machinery, steam steering gear, capstans, gypseys, steam shovels and other marine machinery. The officers are George F. Mellen, president; Thomas S. Mathewson, vice-president and manager; G. A. Gates, treasurer; John G. Faist, secretary.

How Japan is to Encourage Shipping.

Under the direction of the National Association of Manufacturers of the United States, Robert P. Porter of Cleveland, who was in charge of the last United States census, recently conducted an investigation of the commerce and industries of Japan. Mr. Porter's report, which has just been sent out in pamphlet form from the Philadelphia headquarters of the association, contains a chapter on projected steamship enterprises that is especially interesting at this time, on account of the effort that is being made to have the present congress enact legislation favorable to American shipping. In support of the claim that the United States could do more business with Japan if the facilities for transportation between the two countries were better and cheaper, Mr. Porter directs attention to the fact that in 1895 England sold \$56,000,000 (silver) worth of goods to Japan, but purchased only a trifle over \$7,000,000 (silver) worth of that country. On the other hand, the United States bought in the same year \$54,000,000 (silver) worth of Japan, and Japan only bought a little over \$1,000,000 (silver) worth of us. As things stand today, he says, it would probably be cheaper or just as cheap for anyone living in the city of Cleveland who had goods to ship from Japan to send them around via England and thence by land from New York to Cleveland, a distance of some 17,000 miles, rather than send them a distance of 4,500 miles across the ocean and thence overland 3,500 miles. But as a result of the new treaty between America and Japan, which goes into effect in 1899, and as a result also of the new Japanese laws for the encouragement and protection of shipping, Mr. Porter thinks these difficulties will be remedied. He gives details of several projects for steamship lines between New York, Philadelphia and Japan and also between San Diego and Japan.

"For fifteen or twenty years past we have had pending in congress," Mr. Porter says, "bills which, had they been passed ten years ago, would have extended our commerce and made us independent of other nations in the foreign carrying trade. The United States may take a lesson from the practical steps which Japan has taken for the development of her merchant marine. The two measures with this end in view, which went into operation in October, 1896, and which continue in force for fifteen years, comprise, first, a navigation bill, and secondly, a ship building bill. They were framed on the same plan as the bill introduced into our congress and urged ten years ago by Senator Cameron of Pennsylvania, and which extended protection both to ship building and ship owning. Both these laws passed the Japanese imperial diet without a single dissenting voice. Both, in my opinion, will prove measures of vast prospective importance in extending the commercial importance of Japan. The first provides that, under certain conditions as to right of requisition by government, carriage of mails, training of apprentices, etc., a subsidy shall be given for the space of five years, from the date of construction, to every iron steamship of over 700 tons burden at the following rates: Twenty-five cents per ton for every 1,000 miles run at a maximum speed of ten knots; an addition of 10 per cent. to be made for every 500 tons increased displacement over 1,000 tons and up to 6,000 tons; and a further addition of 20 per cent. for each additional knot in speed up to seventeen knots; after the lapse of five years a continuing annual reduction

of 5 per cent. in these amounts is to be made. The second provides that a subsidy of \$12 per ton shall be granted to every Japanese subject building in Japan an iron or steel steamship of 700 tons and over but under 1,000, and of \$20 per ton for one of 1,000 tons and over, with an additional \$5 for each unit of horse power. Both hull and engines must be built under the supervision of the department of communications, and no foreign material is to be used unless specified by that department.

"As there has been up to this time only one private dock yard in Japan of sufficient capacity for the construction of a steamer of over 1,000 tons displacement, and up to the summer of 1895 only one steamer of that size had been built, this new law will undoubtedly cause considerable development in ship building. In 1895 Japan possessed 517 merchant steamers of an aggregate tonnage of 321,522 tons, and the principal shipping company, the Nippon Yusen Kwaisha, or National Mail Steamship Co., alone possessed a fleet of fifty-seven ocean-going steamers with a tonnage of 101,342 tons. The vessels of the latter company make frequent voyages to China, India and Australia, and their lines have been extended to England and across the Pacific to the United States. This line has made a connection with the Great Northern Railway Co. at Tacoma, and 1897 traffic will see a large increase of both freight and passenger traffic to and from Japan by this route. It is well for those who may be responsible for future legislation and commercial treaties to remember that Japan has more inhabitants than all South America; that the Nicaragua canal finds a stronger argument for its construction in facilitating trade with the Orient, and in bringing us nearer the eastern world, than in the increase from trade with South America. In glancing over a statistical abstract, I find that lame as our trade with Japan now is, it is of greater importance than the trade of China, of Portugal, of Russia, of Spain, of Sweden, of Norway, of Switzerland, of Austria-Hungary, of the British West Indies, etc. It is alongside, in economical importance to the United States, of Belgium, Italy and Mexico. With proper facilities it would soon exceed all these nations. It should be today \$100,000,000 (silver), the exports and imports equalizing each other. There is in the Eastern seas nearly \$1,000,000,000 (silver) of trade, a good share of which belongs to the United States. Japan, Korea, China, and Siam aggregate \$725,000,000. To this I have added the trade of the European colonies."

The Bessemer Steamship Company

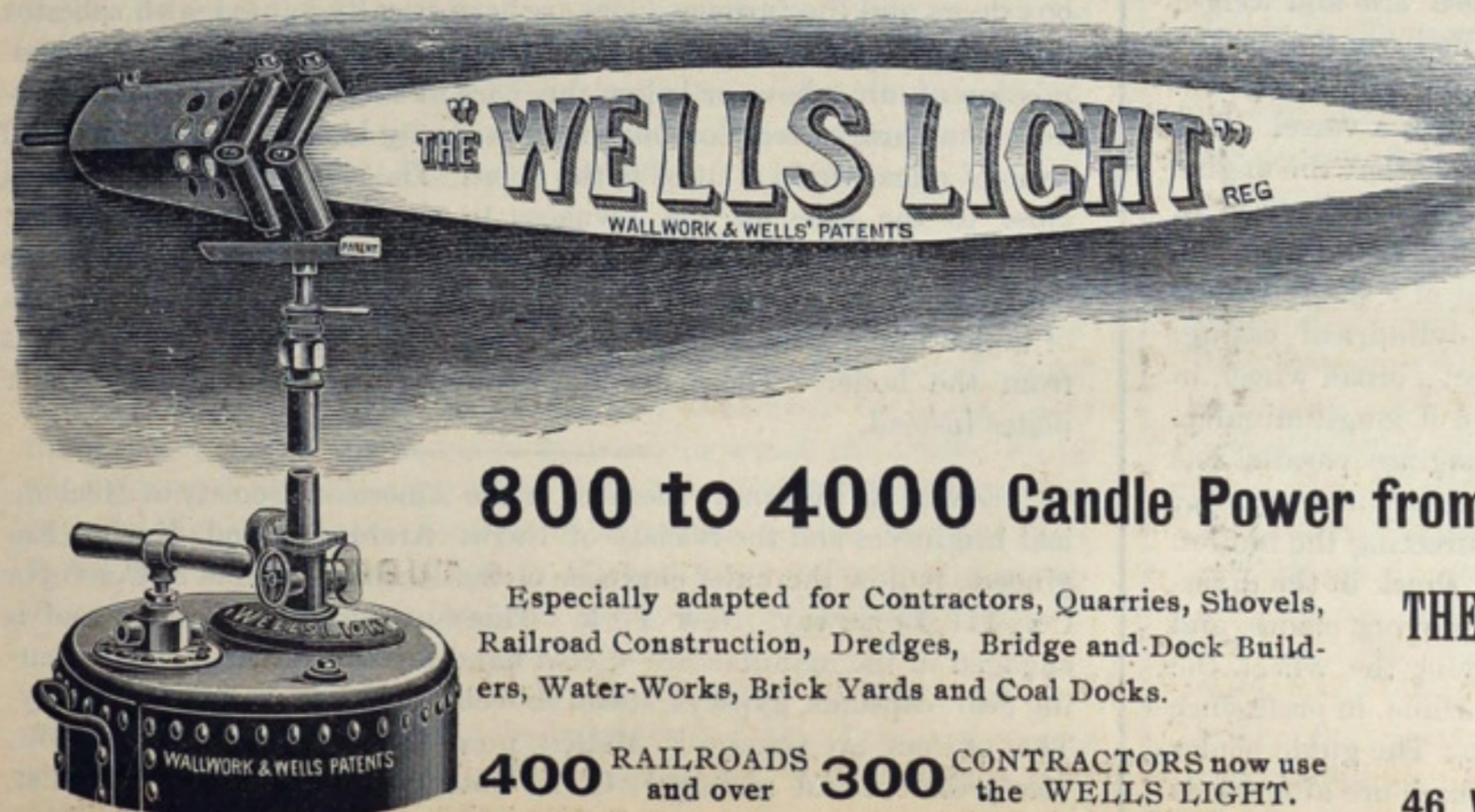
Solicits Catalogues, Prices and Discounts from manufacturers and wholesale dealers in Ship Machinery, Brass Goods, Rope, Paints, Oils, Asbestos, Packing, Hose, Furniture, Piping, Glass and Crockery, Tinware, Ranges, Carpeting, Bedding, Life-preservers, Rafts and Boats, Engineers' Supplies and Tools, Carpenters' Tools, Electric Supplies, Lamps, Grate Bars, Castings, etc., etc., etc.

ALSO QUOTATIONS from Market men and Grocers on the Lakes for Provisions and Meat, best quality only.

CATALOGUES without quotations are not wanted.

ALL GOODS except provisions to be delivered in Cleveland.

Address L. M. BOWERS, General Manager,
CLEVELAND, OHIO.



800 to 4000 Candle Power from KEROSENE OIL.

Especially adapted for Contractors, Quarries, Shovels, Railroad Construction, Dredges, Bridge and Dock Builders, Water-Works, Brick Yards and Coal Docks.

400 RAILROADS and over **300** CONTRACTORS now use the WELLS LIGHT.

10,000 IN USE.

Unaffected by Weather.

Portable, Self Contained.

**THE WELLS LIGHT MANUFACTURING CO.,
EDWARD ROBINSON,**

Sole Proprietor.

46 Washington Street,

NEW YORK.

Chas. E. & W. F. Peck,

58 William St.,
NEW YORK CITY.

812 Royal Insurance Building,
CHICAGO ILL.

C. T. BOWRING & CO.,

5 & 6 Billiter Ave., E. C.,
LONDON, ENG.

INSURANCE.

BROWN & CO.,
202 Main St.,
BUFFALO, N. Y.

J. G. KEITH & CO.,
138 Rialto Bldg.,
CHICAGO, ILL.

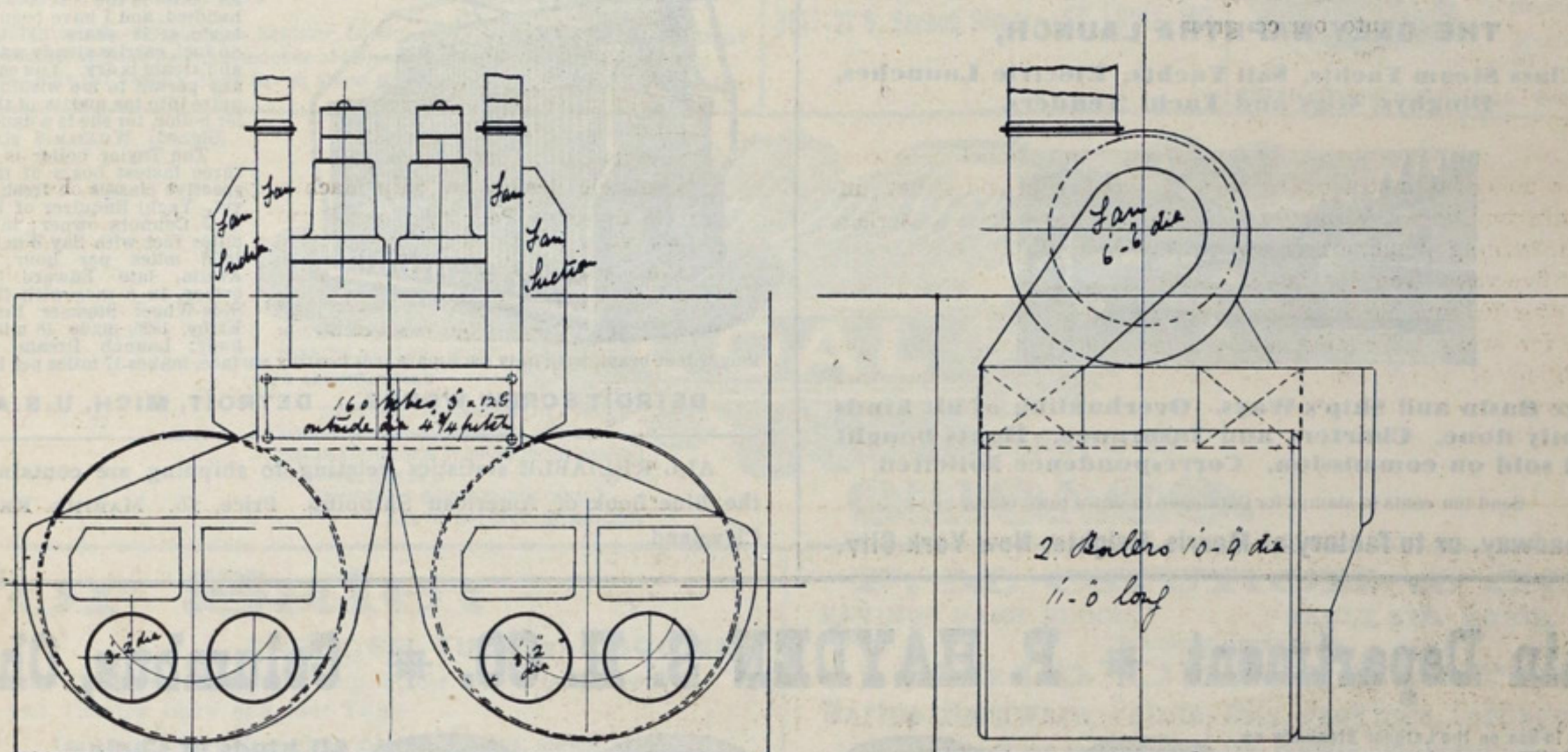
LA SALLE & CO.,
Board of Trade Bldg.,
DULUTH, MINN.

Are prepared to make rates on all classes of Marine Insurance on the great lakes,
both CARGOES and HULLS.

"Great Lakes Register."

F. D. HERRIMAN, Surveyor-General, Chicago, Ill.

The Ellis & Eaves Induced Draft--Serve Ribbed Tubes



DRAWING SHOWING PLAN FOR ADDING THE ELLIS & EAVES DRAFT TO LAKE STEAMERS.

THIS SYSTEM OF DRAFT, WITH THE SERVE TUBES, SAVES MONEY.

SAVES
A \$ \$ \$ A
V \$ \$ \$ V
E \$ \$ \$ E
SAVES

25 PER CENT OF YOUR FUEL BILLS.

40 to 50 PER CENT BOILER CAPACITY.

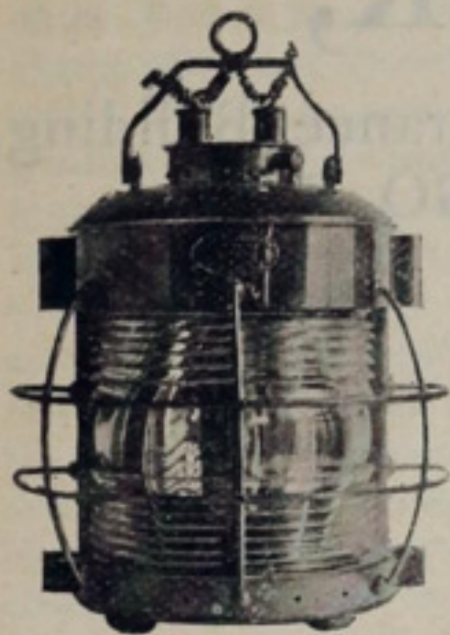
THE LIFE OF THE BOILER BY DRAWING GASES THROUGH TUBES.

FIREMEN AND INCIDENTALLY THEIR WAGES.

CARGO SPACE BY USING A SMALLER NUMBER OF BOILERS.

For PARTICULARS and PRICES of applying to Steamers already Built and to Steamers Building, apply to
THE GLOBE IRON WORKS COMPANY, CLEVELAND, OHIO.

MARINE LAMPS



Oil and Electric
Equipment for
Steamships,
Yachts, etc.
Signal Lights,
Saloon Fixtures,
Cabin Lamps,
Lanterns, etc.



Wm. Porter's Sons,
271 Pearl St., NEW YORK CITY.

INCORPORATED 1794.

Insurance company of North America

CAPITAL, Paid up in Cash, - - \$3,000,000.00
ASSETS, 9,651,808.08

CHARLES PLATT, President.
EUGENE L. ELLISON, 2nd Vice-President.

GEO. H. MCFADDEN, Vice-President
GREVILLE E. FRYER, Sec'y. & Treas.
JOHN H. ATWOOD, Assistant Secretary.

Lake Marine Department.

GEORGE L. McCURDY, Manager.
CHICAGO, ILLS.

Gas Engine & Power Co. and Charles L. Seabury & Co.

Seabury's Water Tube Boilers and Marine Engines.

BUILDERS OF

THE ONLY NAPHTHA LAUNCH,

**High Class Steam Yachts, Sail Yachts, Electric Launches,
Dinghys, Gigs and Yacht Tenders.**



**Storage Basin and Ship's Ways. Overhauling of all kinds
promptly done. Charters and Insurance. Boats bought
and sold on commission. Correspondence Solicited.**

Send ten cents in stamps for Catalogue to down town office,

50 Broadway, or to factory at Morris Heights, New York City.

G. H. FOSTER, Prest. MARK H. HANLON, V.-Prest. & Secy. W. H. WARNER, Treas.
DAVID BARNHISEL, Gen'l Mgr.

The Inter-Ocean Coal & Coke Co.

General office, 513 Perry-Payne Bldg., Cleveland.

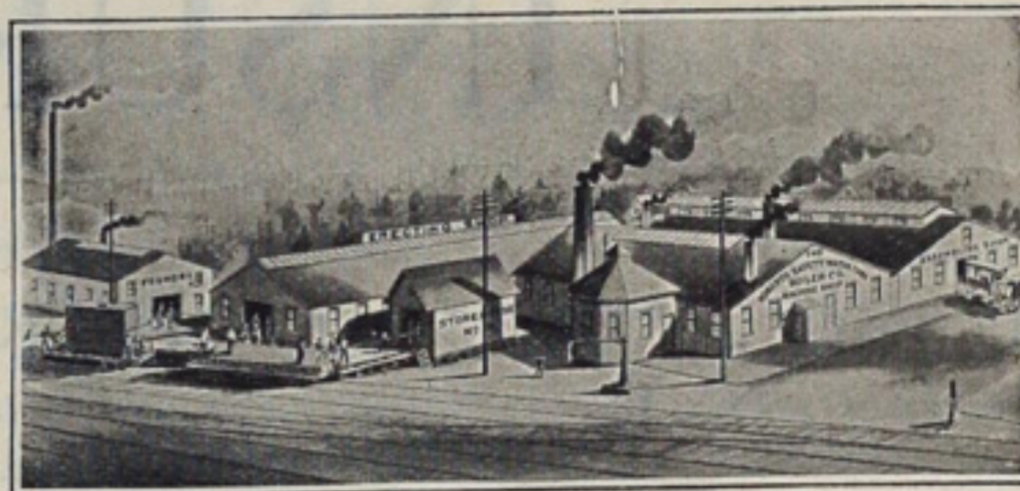
PRODUCERS AND SHIPPERS.

Choicest Grades of YIOUGHIOGHENY COAL FOR STEAMBOAT FUEL.

Lighter in Cleveland Harbor of 400 tons capacity.

CLEVELAND DOCKS, just north of Main Street bridge.

SAULT RIVER DOCK, just above Detour, known as Watson dock



Office of
AMERICAN
STEEL BARGE
Co.

West Superior
Wis.,
Oct. 31, 1895.

The Roberts
Safety Water-
Tube Boiler Co.,
39 and 41 Cort-
landt St., New
York.

Gentlemen:
Replying to
yours of the
28th I am glad

to say that the boiler you furnished us for tug "ISLAY" is giving entire satisfac-
tion. I have heard no complaint about it whatever, but have heard a good deal in its
favor. I ride on the boat frequently and must say that I am much pleased with its
work. Very Truly yours, Alexander McDougall, General Manager.

THE ROBERTS BOILER is the Cheapest, Best and Lasts Longest.

Adapted for use in Yachts, Launches, and Vessels of all Kinds.

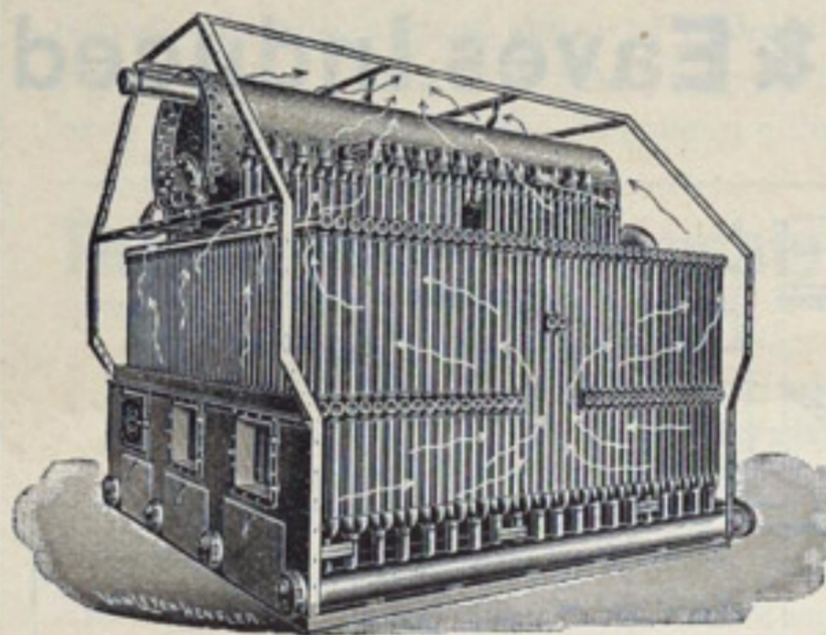
Handsome Illustrated Circular sent free on application to

The Roberts Safety Water Tube Boiler Co.,

WORKS, RED BANK, N. J.

39 & 41 Cortlandt St., NEW YORK.

TAYLOR PATENT UPRIGHT WATER TUBE BOILER.



long, 9 feet beam, with only 350 square feet heating surface, makes 17 miles per hour.

MANUFACTURED BY
DETROIT SCREW WORKS, DETROIT, MICH, U.S.A.

Chief Engineer Skelton of
Steam Yacht Enquirer writes:
"I can honestly say, that the Tay-
lor boiler is the best boiler I ever
handled, and I have been in the
business 18 years. It is light
on fuel, carries steady water line
and steam is dry. You can refer
any person to me wishing to in-
quire into the merits of the Tay-
lor boiler, for she is a dandy."

(Signed) WILLIAM S. ELTON, Jr.
The Taylor boiler is in the
three fastest boats of their re-
spective classes on fresh water,
viz., Yacht Enquirer of Buff lo.
W. J. Connors owner; in a 29½
miles race with Say When made
18.78 miles per hour; Yacht
Azalia, late Edward Henkel
owner, in a race with the fast
Side-Wheel Steamer Frank E.
Kirby, 1896, made 18 miles per
hour; Launch Dream, 63 feet

ALL RELIABLE statistics relating to shipping are contained in
the Blue Book of American Shipping. Price, \$5. MARINE REVIEW,
Cleveland.

Chain Department * P. HAYDEN S. H. CO. * Columbus, Ohio.

Our Chain in use on the Largest Steamers on
the Lakes:

**The Zenith City, Victory,
North West and North Land,
and many others.**



All kinds of Chain—
Stud and Close Link,
Cable Chains.

Write for Prices.

AMERICAN SHIP WINDLASS CO. P. O. BOX 53, PROVIDENCE, R. I.

BUILDERS OF THE

"Providence" Windlasses and Capstans

350 STYLES AND SIZES.
OVER 5000 IN USE.

SEND FOR CATALOGUE.

FRANK S. MANTON, AGENT.

THE ELECTRO DYNAMIC CO.,

224 Chestnut St., Philadelphia.

Electrical Engineers and Mfrs. of Electrical Machinery,

Marine Generating Sets for Supplying Light or Power.

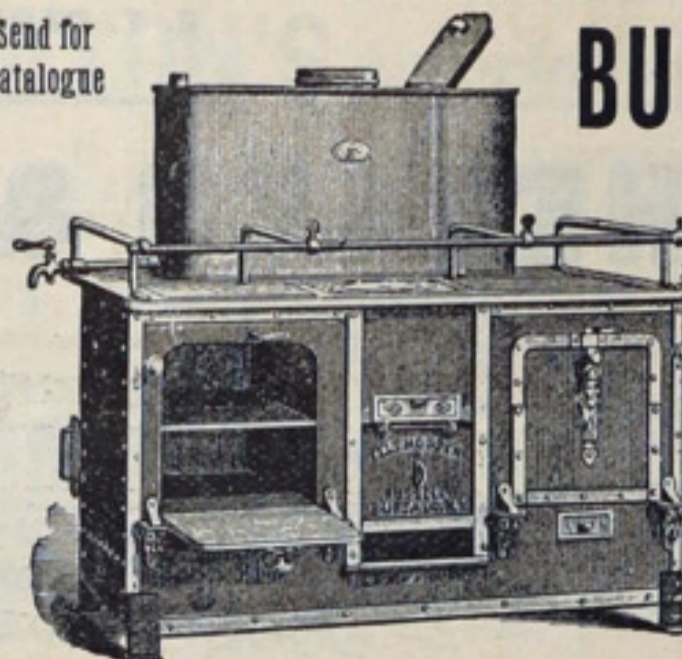
COMPLETE ELECTRICAL MARINE EQUIPMENTS.

Portable Electric Drill Motors now in use at

Cramp & Son's Ship and Engine Building Co.,
Newport News Ship Building and Dry Dock Co.,
Crescent Shipyard.

Union Iron Works,
Brooklyn Navy Yard and
International Navigation Co.

Send for
Catalogue



BUFFALO WROUGHT STEEL RANGES

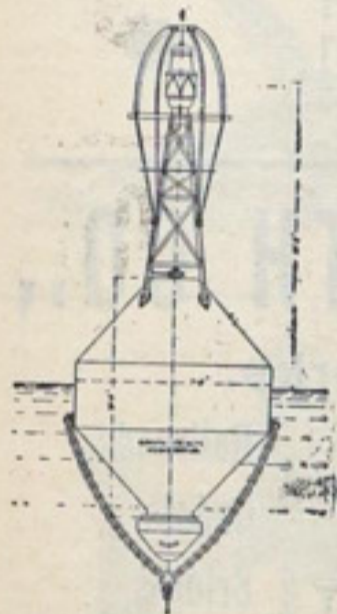
Steamboat and Vessel
Ranges and Boilers,
with patent Rotary
Grate.

SOMETHING NEW AND GOOD.

We also carry the STAMFORD TUG
AND YACHT GALLEY STOVES.

RUSSELL & WATSON

Successors to Felthousen & Russell.
145 Main St., BUFFALO, N. Y.



PINTSCH GAS LIGHTED BUOYS

Adopted by the English, German, French, Russian, Italian, and United States
Light House Departments, for Channel and Harbor Lighting; over
500 gas buoys and gas beacons in service.

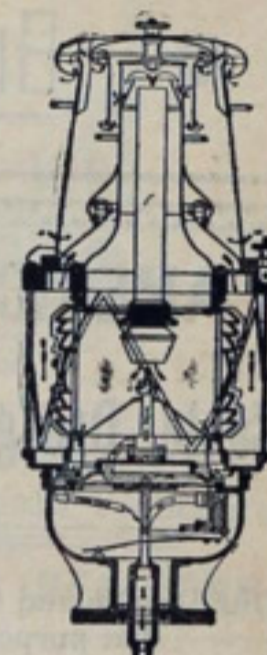
BURN CONTINUOUSLY from 80 to 365 days and nights without attention, and can be seen a
distance of six miles.

Brilliant and Steady Illumination. Economical and Reliable in Operation.

CONTROLLED BY THE

Safety Car Heating & Lighting Company,

160 BROADWAY, NEW YORK CITY.



WM. WILFORD'S Matchless Water-Proof Canvas.

The best in the market for Hatch Covers, is stronger
lighter and more durable than any Water-Proof Goods yet
produced. It is made of a twisted thread of pure flax which
renders it very strong. It will not crack like Cotton Goods
or take fire as easily, which is a great advantage, if soft
coal is used.

EDWARD A. BUNKER,
Room 617, 27 & 29 WILLIAM ST., NEW YORK.

JOHN HAUG, Consulting Engineer and Naval Architect.

Ship and Engineer Surveyor Lloyds Register, London.

Plans, Specifications and Superintendence of Ships and their Machinery.
specialties—Bulk Oil Vessels High Speed Yacht Engines, etc.

206 Walnut
Place,
Philadelphia.

American Boat Building Co. Incorporated.

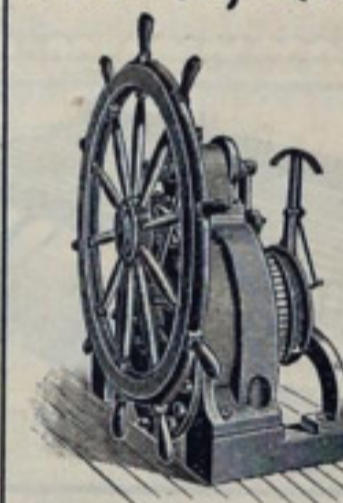


35x7 foot Launch Frame.

3517-21 S. Second Street, ST. LOUIS, MO.

Knock-Down Boats,
something new. We do
the work, you nail
together. Freight low,
prices reasonable. Also
completed Boats, Half-
Raters. Knock-Aparts
and Caroes. Send stamp
for catalogue.

Queen City Hydraulic Steerer.



Best and
Most Powerful
Steerer

FOR TUGS,
STEAMERS,
ETC.

Price—From
\$650 to \$750, ac-
cording to size
and location in
steamer.

Manufactured
by

QUEEN CITY ENGINEERING CO., Buffalo, N. Y.



FUELING DOCKS:
NORTH PIER
18th STREET BRIDGE.
ILLINOIS CENTRAL SLIP 'C'

STORAGE DOCKS FOR ANTHRACITE:
KINGSBURY ST. BETWEEN INDIANA & ERIE STS.
ELSTON AVE. DIVISION ST. BRIDGE (NORTH BRANCH)
NORTH AVE. BRIDGE.
DIVISION ST. BRIDGE (OGDEN CANAL)
SOUTH HALSTED ST. BRIDGE.

COAL

OFFICE,
225 DEARBORN ST.
CHICAGO.

For Sale:

DREDGES, TUGS and SCOWS.

Two Dredges and six Dump Scows, one Flat Scow,
one Derrick Scow and four Tugs—

One with 15 by 17 engine, allowed 110 lbs. steam.
" " 17 by 16 " " 110 " "
" " 20 by 22 " " 125 " "
" " 20 by 24 " " 110 " "

Inquiries from parties who mean business cheerfully
answered.

JAMES ROONEY, 1118 Collingwood Av., Toledo, O.



ALKALI WATER PURIFIER!

A Pure Chemical for the safe Removal and Preven-
tion of Scale in Steam Boilers. In use by many of the
larger steamship lines on the great Lakes. Guaranteed

MANUFACTURED BY

THE J. H. PARSONS CHEMICAL CO.,
1509 Masonic Temple, CHICAGO, ILL.

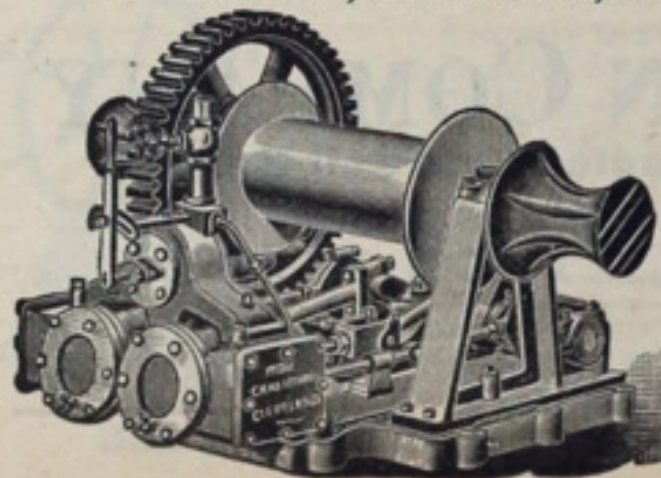
P. M. CHURCH & CO.,
SAVINGS BANK BLOCK, SAULT STE. MARIE, MICH.
LEADING DEALERS IN

Ship Chandlery,
Marine Hardware, Paints, Oils, Packings, Cordage, Etc.

FIRST-CLASS COPPERSMITH AND TINSHOP IN CONNECTION

The Chase Machine Co.

111 Elm St., Cleveland, O.



**MACHINISTS
and ENGINEERS**

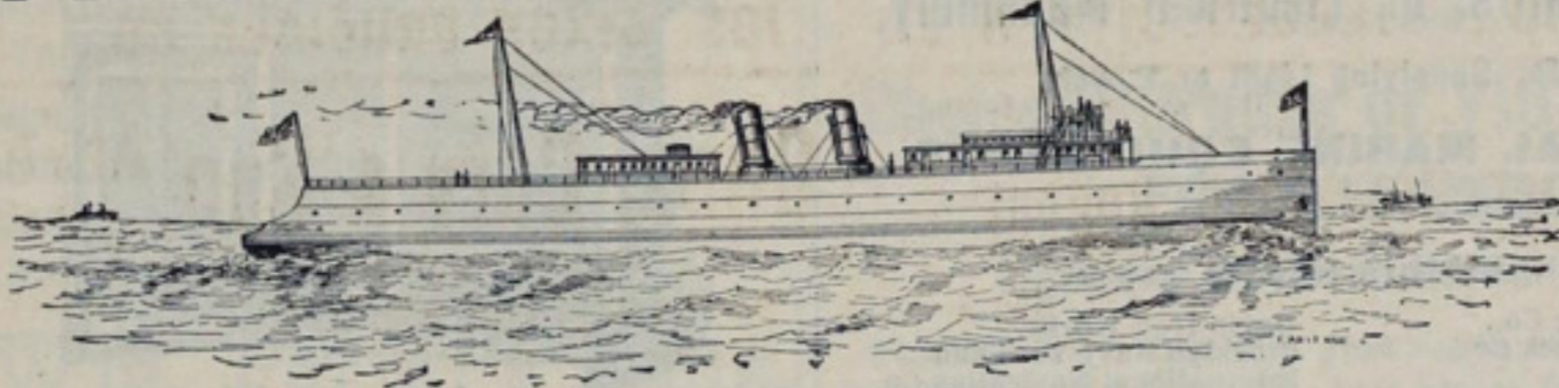
MANUFACTURERS OF
Land and Marine Engines
and Steam Pumps.

SOLE OWNERS AND MANUFACTURERS OF
Chase Fog Whistle Machine.

Over 150 in use on the best class
of Lake Steamers.

Special Attention given to
MARINE REPAIR WORK.

Engineers' Supplies.
Asbestos Pipe and Boiler Covering.
TELEPHONE 984.

F. W. WHEELER,
President.E. T. CARRINGTON,
Vice-President.C. W. STIVER,
Secy. and Treas.**F. W. WHEELER & CO., WEST BAY CITY, MICH.**

F. & P. M. CAR FERRY.

● Builders of all kinds of METAL AND WOODEN SHIPS. ●

AMERICAN CHAIN CABLE WORKS.

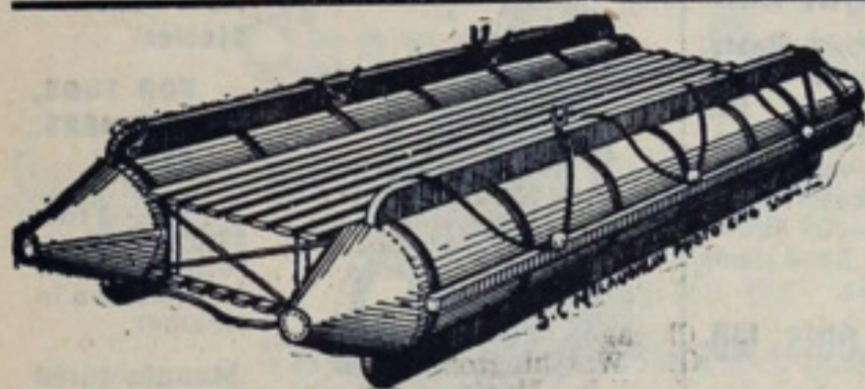
ESTABLISHED 1865.

Cable, Dredge, Quarry, Shipping, Crane and Rafting

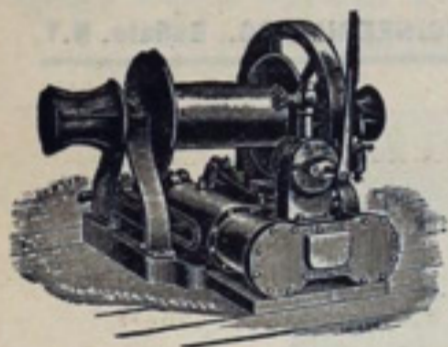
CHAINS.

Our Dredge and Crane Chains are made of Iron Rolled Specially for that purpose in three qualities, "Burden's," "H. B. & I." iron, and "Burden's Best Best" iron.

THE J. B. CARR COMPANY, TROY, NEW YORK.

Thos. Drein & Son,
BUILDERS OF

Metallic Life Boats and Rafts, Government and Pleasure Boats, Block and Granulated Cork Life Preservers. Outfit for Lake Steamers a Specialty. TATNALL & RAILROAD STS. Wilmington, Del.

DOCK and DECK HOISTS
ALL KINDS OF
Machinery & Friction Hoists.

SEND FOR PRICES AND CIRCULARS.

JACKSON & CHURCH,
SAGINAW, MICH.**DON'T BLAME THE CAP'T**

for last year's misfortune, but instruct him to send 10 cents in stamps for our 235 page Illustrated Catalogue, make up his order and send it to us; he will find it "Chock-a-Block" full of articles needed on every Yacht, Boat and Canoe afloat.

L. W. FERDINAND & CO.,

176-180 Federal Street.

BOSTON, MASS.

HOWARD H. BAKER & Co.**Ship Chandlers and Sail Makers,**

18 to 26 Terrace. — BUFFALO, N.Y.

H. CHANNON COMPANY

Ship Chandlers and Sail Makers.

AGENTS FOR

RYLANDS BROS.

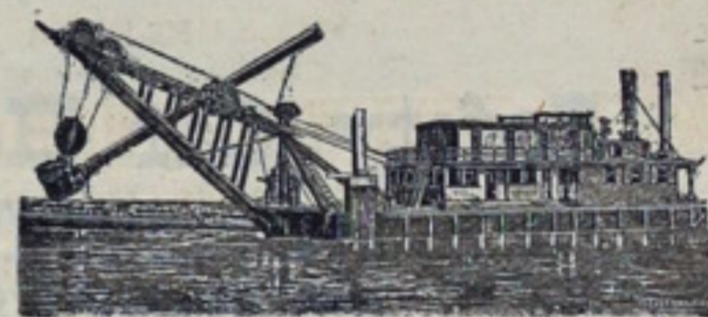
MANUFACTURERS OF

ENGLISH GALVANIZED STEEL HAWSERS,

24-26 Market Street, CHICAGO, ILL

**THE L. P. & J. A. SMITH CO.,**

Contractors of Public Works.

Dredging,
Pile-Driving,
Breakwaters,
Dry Docks and
Pier Building,Railroads,
Canals,
Bridges,
Foundations,
Etc., etc.

23 River St.,

CLEVELAND, O.



H. E. STEVENS.

TOM MEAD.

LEW PRESLEY

BUCKEYE STEAM FITTING CO.**Steam Fitters, Engineers Supplies,**

Phone 4058.

AGENTS FOR

RAINBOW PACKING.

Open Day and Night.

117 River St., CLEVELAND, O.

The Martin-Barriss Co.

IMPORTERS AND MANUFACTURERS OF

Mahogany, White Mahogany,

AND ALL NATIVE CABINET WOODS.

HIGH GRADES OF KILN DRIED WOODS FOR
CABIN WORK AND INSIDE TRIM.*White Oak Timbers and Plank*CONSTANTLY ON HAND AND SAWED TO ORDER
ON SHORT NOTICE.

654 Seneca Street,

Cleveland, Ohio.

**DETROIT SHEET METAL
AND BRASS WORKS**No. 64-66-68-70-72
ORLEANS STREET,
DETROIT, MICH.Jobbers of..... Pipe, Valves, Fittings. Packing, Oil and
Engineers Supplies.Contractors for High Class Steam Fitting, Steam Heating,
Plumbing, Copper Work, and all
Classes of Sheet Metal Work.Manufacturers of Clark's Patent Metallic Life Raft, Side
Lights, Marine Hardware, Hurricane,
Cabin and Platform Lamps, Trip
Gongs, etc.Agents for..... Laidlaw - Dunn - Gordon Steam Pumps,
Warren Webster's Specialties, and
Buffalo Forge Co.'s Fans, Engines and
Heaters.

Engineers can be waited on promptly day or night.

DIXON'S Graphite Pipe Joint Compound

Enables you to MAKE A TIGHTER JOINT than you can possibly make with red lead. You can do it easier, and parts can be separated at any time without breaking anything. Send for sample and circular.

JOS. DIXON CRUCIBLE CO., JERSEY CITY, N. J.



Fred'k Baldt, President. W. M. Gelston, Vice-President.
W. S. Bickley, Sec'y and Treas.

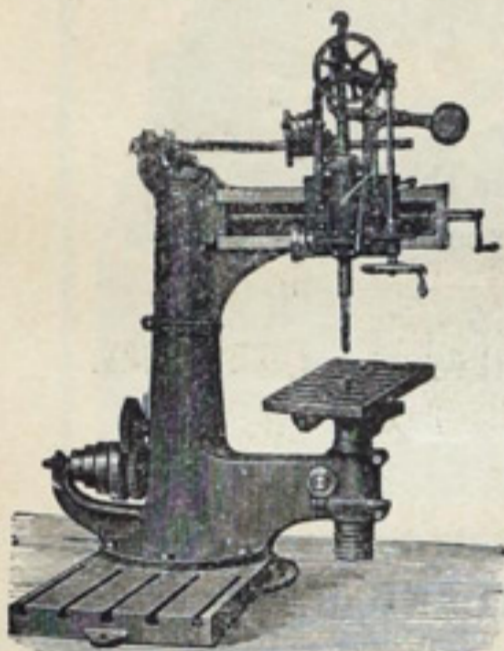
Baldt Patent Stockless Anchor.

Made of the finest quality of open-hearth steel and constructed on the ball and socket principle.

Many points of superiority over ordinary Stockless Anchors.

BALDT ANCHOR COMPANY,
CHESTER, PA.

WALTER MILLER, Western Reserve Bldg.,
Cleveland, Ohio,
Representative for the Great Lakes.

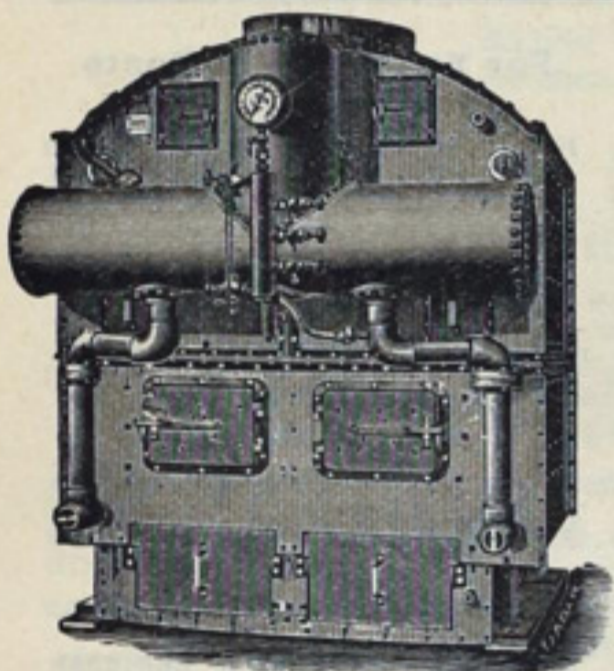
**Bement, Miles & Company,**
PHILADELPHIA, PA.

MANUFACTURERS OF
Metal Working Machine Tools

For Ship Yards, Railroad Shops,
Locomotive and Car Builders,
Machine Shops, Rolling Mills,
Steam Forges, Boiler Shops,
Bridge Works, etc., etc.

**Steam Hammers, Steam and
Hydraulic Riveting Machines.**

New York Office: Taylor Bldg. No. 39 Cortlandt St.
Chicago Office: 1534 Marquette Building.

**ALMY'S PATENT
SECTIONAL
Water-Tube Boilers.**

NOW USED IN

18 Passenger Boats from 70 to 160 feet long.
27 Steam Yachts from 50 to 160 feet long.

U. S. Torpedo Boat "Stiletto."

Numerous Small Launches and Stationary
Boilers are giving most excellent results.

ALMY WATER-TUBE BOILER CO.,

No. 178-184 Allens Avenue,
near Rhodes St.

PROVIDENCE, R. I.

VANDUZEN Steam JET PUMPS

THE BEST IN THE WORLD.
Pumps any kind of Liquid. Always in order.
Never clogs nor freezes. Fully Guaranteed.
COST \$7 AND UPWARD. Especially useful for
Mines, Quarries, Pits, Wells, Clay Pits, Breweries,
on Steamships, Ferryboats, Sugar Plantations, etc.
A full stock always on hand.

Descriptive Catalogue and Prices fur-
nished Free. **THE E. W. VAN DUZEN CO.,**
Cincinnati, O.

**FRANKLIN
HOUSE**

ESTABLISHED 1837.

Cor. Bates and Larned Sts.,
DETROIT, MICH.

Only a Block from Woodward &
Jefferson Aves. Very Central
Near All Car Lines.

Per Day, **H. H. JAMES, Prop.**
\$1.50.

**SELLERS' RESTARTING
INJECTOR**

LONG LIFTS. HOT WATER. SIMPLEST AND BEST. LONG SERVICE. WIDE RANGE.

For Stationary, Portable,
Traction Engines, Tugboats, &c.
Thoroughly Reliable—Perfectly Automatic.
JENKINS BROS., - Selling Agents,
NEW YORK, BOSTON, PHILA., CHICAGO.

DIXON'S Lubricating Graphite

Is fully explained in an INTERESTING AND INSTRUCTIVE
PAMPHLET which is FREE to all interested. It will pay all
Engineers and Machinists to SEND FOR IT.

JOS. DIXON CRUCIBLE CO., JERSEY CITY, N. J.

Chas. Corv & Son

Manufacturers of the
**Mechanical and Electric
Marine Telegraph,**



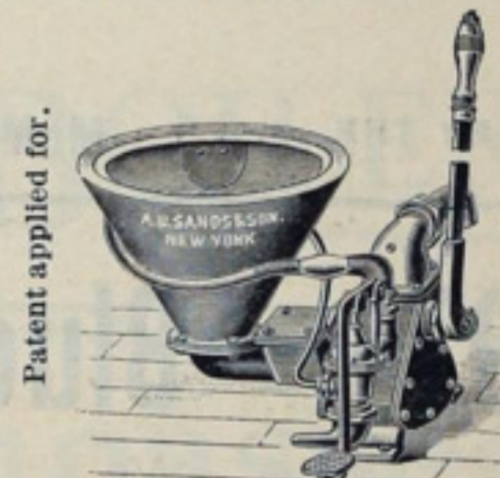
**Electrical
Helm Indicators
Electric Call
Bells.**

Engine Bells and
Brass Work of
all descriptions,
Shrieking and
Siren Whistles.

278 DIVISION ST.,
NEW YORK CITY.

Alfred B. Sands & Son

YACHT PLUMBERS,
AND MANUFACTURERS OF
YACHT PLUMBING SPECIALTIES.

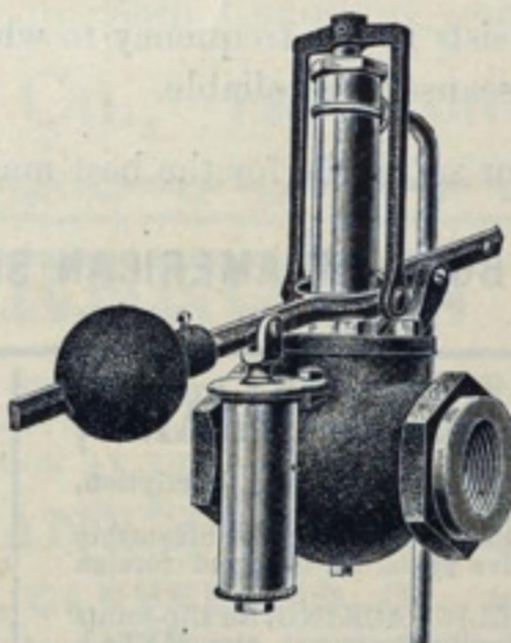


Patent applied for.

The only pump water closet in the world so
constructed as to be positively free
from danger of flooding.

**Folding Lavatories, Pumps, Ventilators,
Etc., Etc.**

134 Beekman St., NEW YORK.

**The "DAVIS" Pressure Regulator
and Reducing Valve.**

Is the simplest and best for reducing the pressure
to Steam Steering Engines, Donkey Engines,
Steam Winches and all places requiring a uniform
pressure below that of boilers.

No diaphragms, spring or packing.

Cut shows ball weight. We can furnish scale
weights if preferred.

MANUFACTURED BY

G. M. DAVIS & CO.
106 N. Clinton St., CHICAGO, ILL.

FOR SALE BY

R. E. Hills, Chicago. U. H. McCutcheon, Buffalo
Geo. Worthington Co., Cleveland.
P. M. Church, Sault Ste. Marie. Jas. Walker & Son, Detroit
Jas. Clements & Son, Bay City, Mich.
Cleveland Ship Building Co., Cleveland.
Chicago Ship Building Co., Chicago.

Selling agents—The McIntosh-Huntington Co., Cleveland, O.; The Detroit Sheet Metal
and Brass Works, Detroit, Mich.

NEVERSINK CORK JACKET AND LIFE BELT.

Warranted 24 lb. Buoyancy and full Weight of Cork, as required by U. S. Inspectors.
Consolidated Cork Life Preservers. Superior to all others. Ring Buoys and Fenders.

SAFEST, CHEAPEST. Approved and adopted by U. S.
Board of Supervising Inspectors.

Also adopted by the principal Ocean, Lake and River
Steamer Lines as the only Reliable Life Preserver. Vessels
and the trade supplied. Send for catalogue.

Awarded four Medals by World's Columbian Exposition



**Metallic
and
Wooden
Life
Boats.**



Metallic Life Rafts, Marine Drags.

Manufacturer of Woolsey's Patent Life Buoy, which is the
lightest, cheapest and most compact Life Raft known.

Send for Illustrated Catalogue.

Get our prices before buying elsewhere.

D. KAHNWEILER,

437 Pearl Street, NEW YORK CITY.

SHERIFFS STEAM STEERER.

MADE IN TWO SIZES

Are easy to adjust and can
be handled by any one.

The Steerer can be arranged
to set in pilot house or aft.

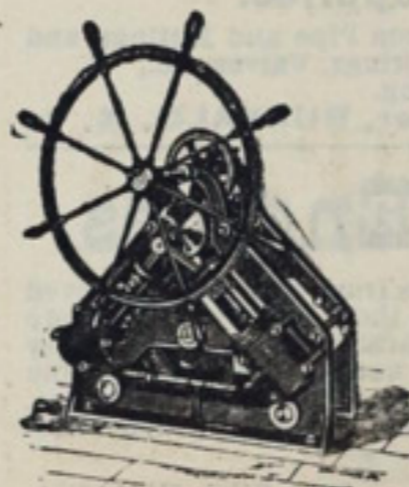
No Steerer will be sold with-
out a quadrant.

Steerer will be sold on ap-
proval.

Manufactured by

SHERIFFS MFG. CO.

126-130 Barclay Street,
MILWAUKEE, WIS.



Paint your
Vessels with

Superior Graphite Paint.

NO BLISTERING, CRACKING OR SCALING.

Made especially for Stacks, Decks, Sides, Hulls and Water Com-
partments. Strictly anti-rust, and most durable
and economical.

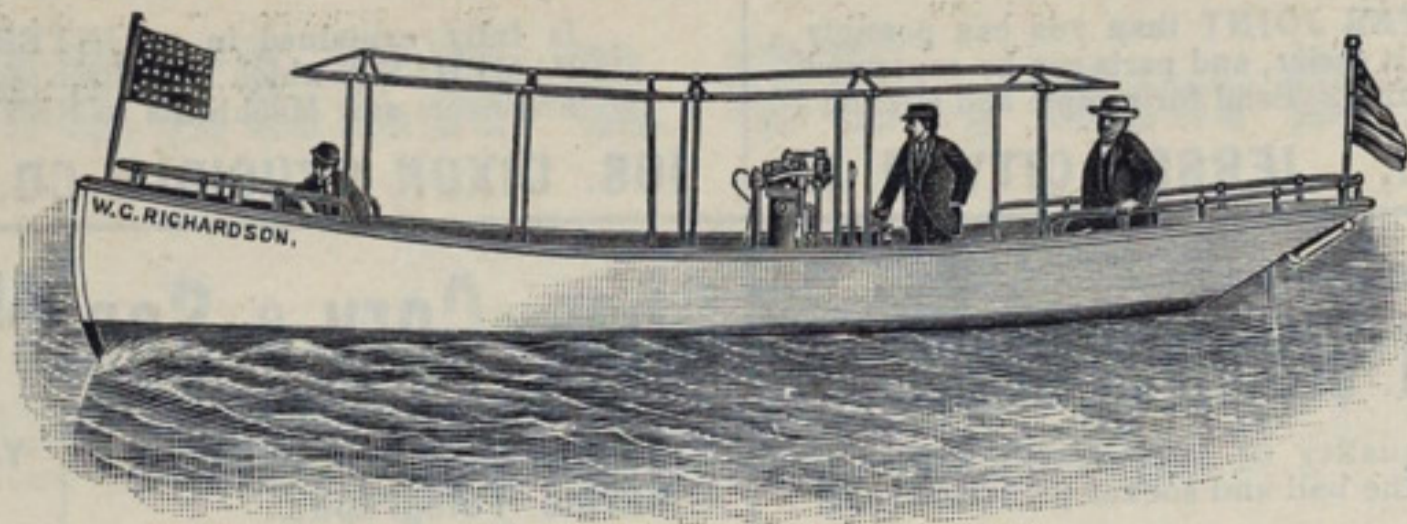
DETROIT GRAPHITE MFG. CO., 541 River St., Detroit, Mich.

The Wootters Gas Engine.

Especially adapted for launches and ferry boats. Fitted with friction clutch or reversible shaft.

These engines are giving entire satisfaction in the pleasure yacht W. C. Richardson and the delivery launch Lotta.

Prices and particulars furnished on application.



NAPHTHA LAUNCH W. C. RICHARDSON, (Engine 8 horse power—speed 8 miles an hour.)

BUILT BY THE **McMYLER MFG. CO., GAS ENGINE DEPARTMENT, 180 Columbus St., CLEVELAND, O.**

Suitable for all purposes requiring from 1 to 200 horse-power, with the lowest possible expenditure.

Engines of the stationary type built for every purpose where a reliable and efficient power is required.

1897—Blue Book of American Shipping—1897

"IT IS BETTER TO BOAST AFTER THE BATTLE."

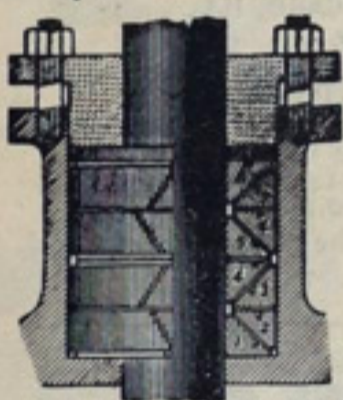
The publishers of the 1897 Blue Book are using their energy to make the 1897 Blue Book more valuable than the 1896 Blue Book. Last year we promised to get out a book that would be satisfactory. The result exceeded all expectation and was pronounced far superior to any lake directory ever published.

The value of a directory consists in the frequency to which it is referred to. The Blue Book is used three times to one, more than any other—because it is reliable.

If you want to advertise in or subscribe for the best marine directory ever published, write, at once,

BLUE BOOK OF AMERICAN SHIPPING, 409 Perry-Payne Bldg., CLEVELAND, O.

KATZENSTEIN'S Self-Acting METAL PACKING,



For PISTON RODS, VALVE STEMS, etc., of every description, for Steam Engines, Pumps, etc., etc. Adopted and in use by the principal Iron Works and Steamship Companies, within the last twelve years, in this and foreign countries.

FLEXIBLE TUBULAR METALLIC PACKING, for slip-joints on Steam Pipes, and for Hydraulic Pressure; also METAL GASKETS for all kinds of flanges and joints.

DOUBLE-ACTING BALANCED WATER-TIGHT BULKHEAD DOORS for Steamers. Also Agents for the McColl-Cumming PATENT LIQUID RUDDER BRAKE. For full particulars and reference, address:

L. KATZENSTEIN & CO.,

General Machinists, Brass Finishers, Engineers' Supplies,
357 West St., New York.

Ship Lamps

OIL AND ELECTRIC FIXTURES

— FOR —

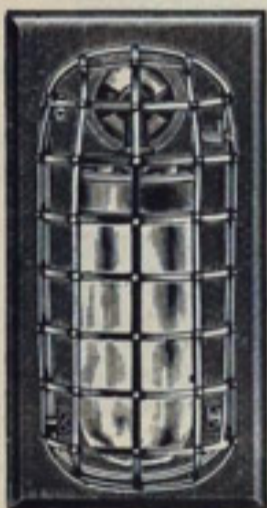
Steamships, Yachts, &c.

GREAT VARIETY OF DESIGNS.

Prices and Cuts on Application.

PAGE BROS. & CO.

347 to 357 Cambridge St. Boston, Mass.



C. H. McCUTCHEON,

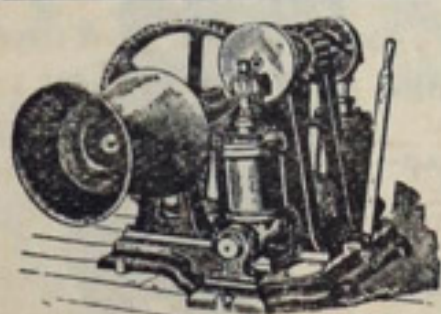
(Successor to SAMUEL McCUTCHEON.)

**Copper, Tin and Sheet Iron Manufactory,
Steamboat and Engineers' Supplies.**

All kinds of Brass Cocks, Globe Valves and Couplings, &c. Iron Pipe and Fittings, and Mill Supplies. Rubber Belting, Hose and Packings, Springs, Valves, &c., Leather Belting and Usudurian Packing.

Telephone No. 68.

No. 18 Ohio Street, BUFFALO, N. Y.

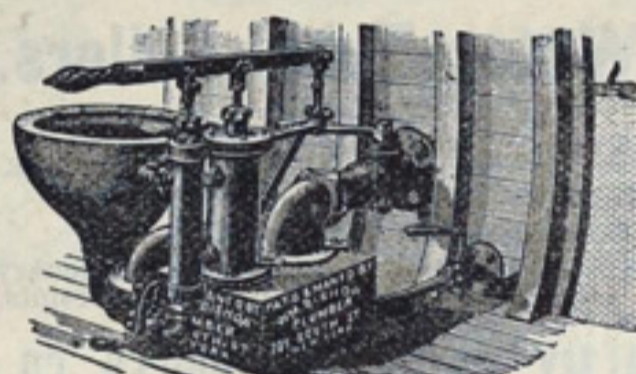


Hoisting Engines.

We build them in all sizes from new and improved designs. Every engine thoroughly tested before leaving our shop, and guaranteed to be satisfactory in every case. When in want of a Hoist for marine work, dock work, mining or any other purpose, kindly permit us to name you prices. We know we can please you.

Marine Iron Co., Bay City, Michigan.

Patent Pump Water Closet.



For Yachts, Pilot Boats,
Naval Ships, Etc.

For above or below water line. In use on U.S. Cruiser New York, Columbia, and Battleships Indiana, Maine, Texas, Massachusetts, Etc. Our No. 4 can be put in a space 14 in. x 15 in.

WILLIAM BISHOP & SON,

205 South St., NEW YORK.

724 Third Av., BROOKLYN.

Telephone 569 Franklin.

Yacht Fittings a Specialty.

MIERS CORYELL

21 E. 21st Street, NEW YORK.

Consulting Mechanical Engineer.

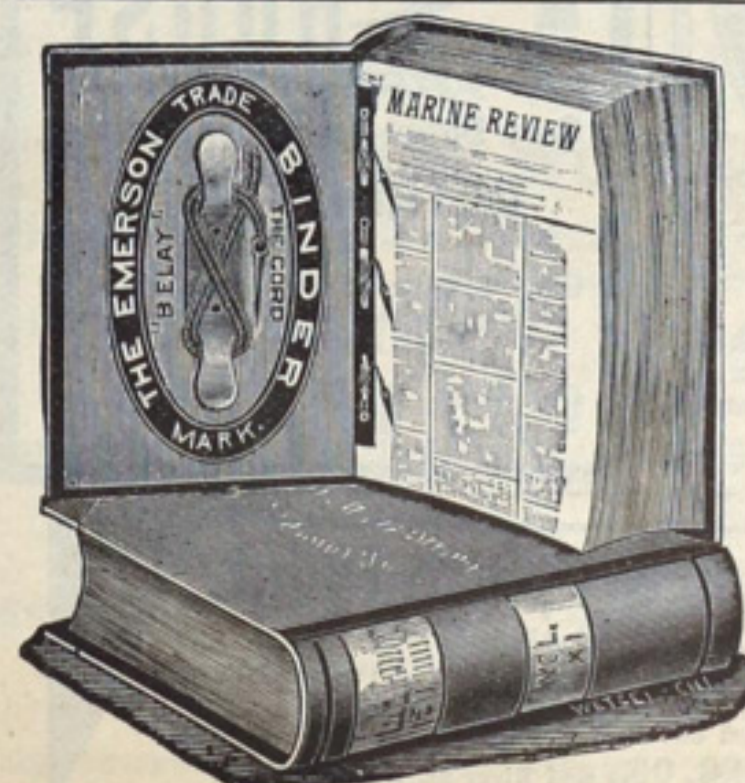
Plans, Specifications and Superintendence. Marine and Water Works Engines and Boilers.



'96 JENKINS '96

Is the Perfection of Joint Packing, Instantaneous, Does not Squeeze out and not necessary to follow up joint. We guarantee it to last for years on any and all pressures of steam or any kind of joint where packing is required. Does not rot, burn or blow out, therefore the best for all purposes. Call for and insist on having '96 JENKINS '96 stamped like cut.

JENKINS BROS. New York, Boston, Philadelphia, Chicago.



ONE OF THESE BINDERS

that will hold 52
NUMBERS
of the

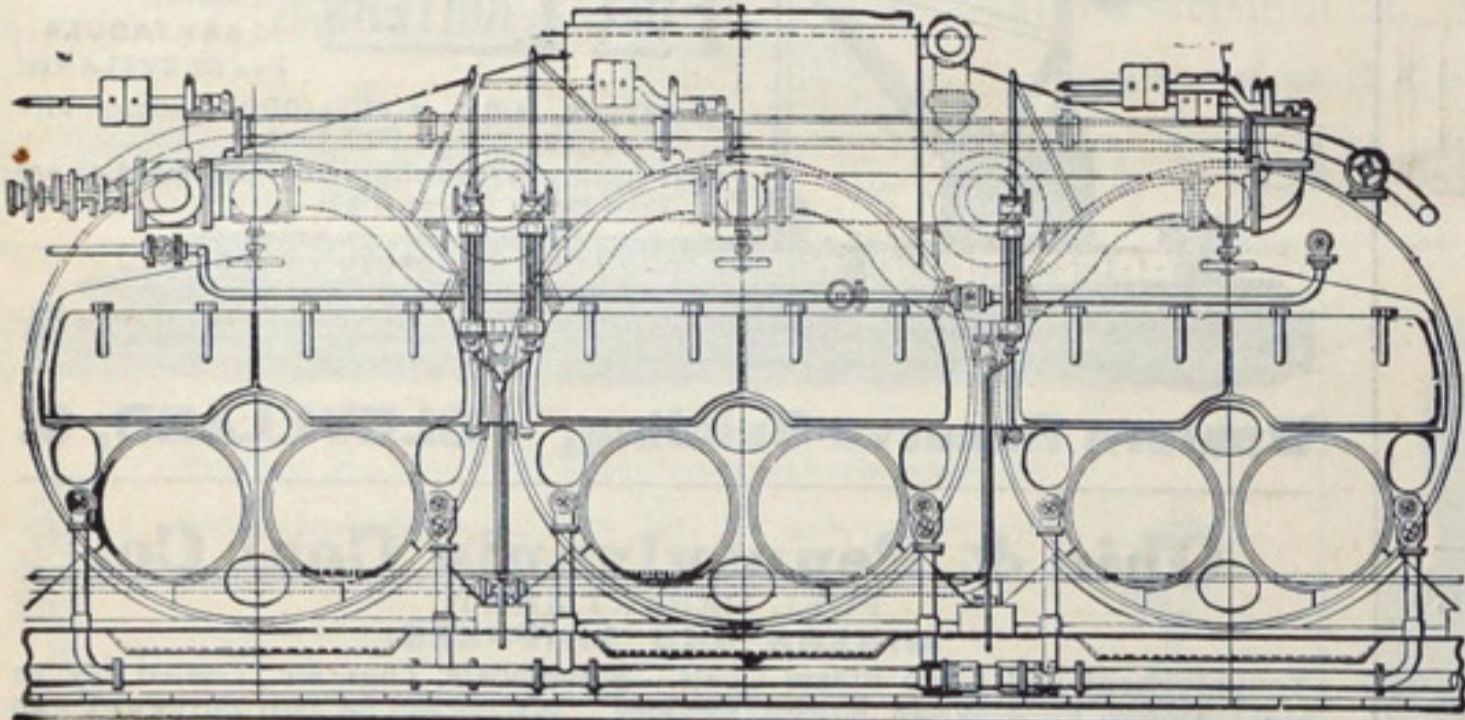
MARINE REVIEW,

Will be mailed to
any address on
receipt of \$1.

MARINE REVIEW...

409 Perry-Payne Bldg.,
CLEVELAND, O.

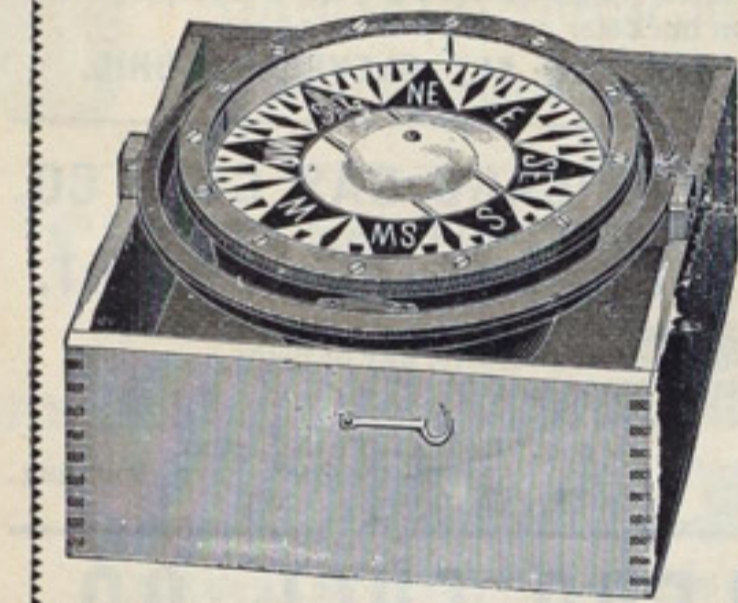
LAKE ERIE BOILER WORKS, BUFFALO, N. Y.



THE BEST EQUIPPED PLANT
IN AMERICA

FOR THE MANUFACTURE OF

MODERN MARINE BOILERS.



Liquid (Spirit) Compasses

of our make, in seven sizes, embody every known point of excellence possessed by those of other makers, and in addition have been improved in many important details.

We therefore positively assert that, in general construction and thoroughly scientific action of the card, we offer the best Liquid Compass ever made in this or any country. For sale by Ship Chandlers generally.

John Bliss & Co., 128 Front Street, New York.

MARINE VALVE OIL FOR INTERNAL LUBRICATION.

RENOWN ENGINE OIL FOR EXTERNAL LUBRICATION



Marine Valve,
Renown Engine,

Eldorado Engine,
Crank Case,

Victor Signal,
Dark Lubricating,

Mineral Seal,
Head Light,

Artic Cup Greases,
and Lard Oils.

— CARRIED IN STOCK AT THE —

STANDARD OIL COMPANY'S MARINE DEPOT,

TELEPHONE 77.

123 River Street, CLEVELAND, O.

MAIN OFFICE TELEPHONE 682.

ALSO FOR SALE
BY
STANDARD OIL
COMPANY,

Chicago, Ill., No. 5 Wabash Ave.
Racine, Wis.
Milwaukee, Wis., Broadway & Mason.
Sheboygan, Wis.
Manitowoc, Wis.
Green Bay, Wis.

Marinette, Wis.
Oshkosh, Wis.
Duluth, Minn.
West Superior, Wis.
Hancock, Mich.
Marquette, Mich.

Buffalo, N. Y.
Sault Ste. Marie, Mich.
West Bay City, Mich., M.C. Ry. & 10th St
Saginaw, Mich., Eighth & Sears Sts.
Detroit, Mich., 46 Jefferson.
Toledo, O., Summit & Monroe Sts.



ATLANTIC REFINING COMPANY, French & 16th Sts., Erie, Pa.
D. ROBESON, Port Huron, Mich.
W. S. MCKINNON, Ashtabula Harbor, O.
HULL & RAND, Huron, O.

EDWARD BRAMMALL, Bnton Harbor, Mich.
BABY & DALE, St. Clair, Mich.
N. C. ALLEN, Lorain, O.
A. F. HARRINGTON, Conneaut Harbor, O.

A. H. MCGONAGIL, South Chicago, Ill.
MARINE SUPPLY Co., Fairport, O.
F. KEANZ, Sandusky, O.
THE M. I. WILCOX CORDAGE & SUPPLY Co., Toledo, O.

"The most perfect feed water heater and purifier we ever saw."—R. HAMMOND.

IN PRACTICAL USE ON 25 LAKE STEAMERS.

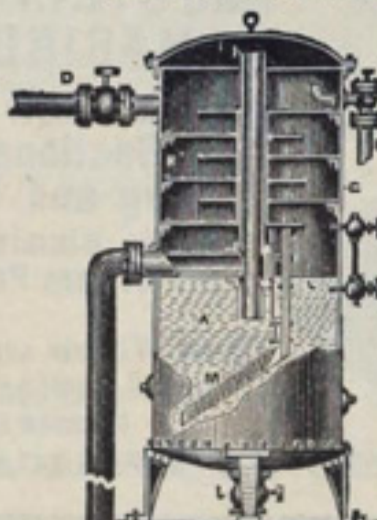
Every Purifier Warranted to Remove all Sediment or
Scale-Forming Substance.

ROBERT LEARMONTH PATENTEE,

200 LAFAYETTE AVENUE, - - - - - BUFFALO, N. Y.

SEND FOR CIRCULAR.

THE BUFFALO
FEED
WATER
HEATER
AND PURIFIER.



Names of Steamers on the Lakes
using the

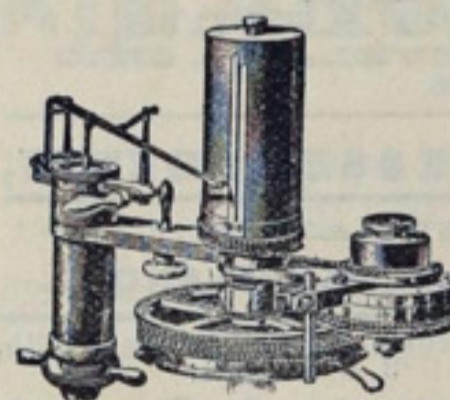
Buffalo Feed Water
Heater and Purifier.

RED STAR LINE.—Str. Robert
Mills, Str. Wyoming.

BAY CITY, MICH.—Str. H. C.
Sibley, Str. B. Boutelle.

ANCHOR LINE.—Str. Mahoning,
Str. Schuykill, Str. Cpdortis, Str.
Susquehanna, Str. Clarion, Str.
Lehigh, Str. India, Str. China,
Str. Japan, Str. Lyeoming, Str.
Conemaugh, Str. Juniata, Str.
Alaska, Str. Delaware, Str. Con-
estoga, Str. Wissahickon, Str.
Philadelphia, Str. Winslow.

LAKE MICHIGAN AND LAKE
SUPERIOR TRANSPORTATION
Co.—Str. Manitou.



TWIXT YOU AND I

The ENGINEER that don't OWN an INDI-
CATOR or carry in his closet some EUREKA
PACKING is behind the age. The former enables
you to tell how your engine is working. The latter
makes the engine work smoothly. Send for Catalogue.

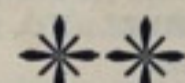
INDICATOR. \$40. WHEEL. \$15.

JAS. L. ROBERTSON & SONS,

Successors to Hine & Robertson Co.

40 Cortlandt St., N.Y.

EVERY MARINE ENGINEER
on the Lakes, and every second
who is studying for first class
papers, ought to possess



Reed's Engineers' Hand Book

(Fifteenth Edition.)

Containing 600 engravings and a
portfolio of drawings of all parts
of marine engines.

It has always sold for \$4.50 and
\$5. Until Dec. 1 any subscriber to
the REVIEW may have a copy
sent post paid by enclosing this
advertisement and \$4 to

Marine Review.

BOOK DEPT.

409 Perry-Payne Bldg., CLEVELAND, O.

**..STEAM..
ENGINEERING**

(Loco., Stat'y. and Marine); Electricity; Mechanics; Mechanical and Architectural Drawing; Plumbing; Architecture; Mining; Civil Engineering in all Branches.
The International Correspondence Schools

**To Steam..
..Engineers,**

Machinists, Electrical Workers, Civil Engineers, Draughtsmen, Steam Fitters, Miners, Carpenters, Plumbers.
References Everywhere. Send for Circular. State Subject you wish to Study.
Box 965 Scranton, Pa.

HARVEY D. GOULDER,
LAWYER AND PROCTOR IN ADMIRALTY,
CLEVELAND, O.

ALBERT J. GILCHRIST, PROCTOR IN ADMIRALTY,
No. 604 PERRY-PAYNE BLDG., CLEVELAND, OHIO.

AMBROSE V. POWELL, C.E., * * Consulting Engineer.

Specialties: Designing and Construction of DRY DOCKS, Harbor Works, Docks and Plants for Handling Coal and Ore.

Office, 507 Chamber of Commerce, CHICAGO, ILL.

C. E. KREMER, Attorney and Counselor-at-Law and Proctor in Admiralty.

Rooms 14, 15 and 16, Bryan Block,

184 LA SALLE ST., CHICAGO, ILL.

BROWN & COOKE,
Counselors at Law and Proctors in Admiralty,
34-35-36 White Building, BUFFALO, N. Y.

HAWGOOD & MOORE

Vessel and Insurance Agents,

Residence Phone, Doan 446—W. A. Hawgood.
Long Distance Tel. 2395.

608 Perry-Payne Bldg., CLEVELAND, O.

W. C. RICHARDSON,

VESSEL AND MARINE INSURANCE AGENT.

Office Telephone 338.

Residence Telephone 2938. Nos. 606 & 607 Perry-Payne Bldg., Cleveland, O.

C. F. PALMER.

C. L. HUTCHINSON.

PALMER & CO.,

VESSEL AGENTS AND UNDERWRITERS,

Telephone 644.

515 and 516 Perry-Payne Bldg., Cleveland, Ohio.

J. H. BARTOW,

TELEPHONE 717.

Vessel and Insurance Agent,

611 and 612 Perry-Payne Bldg., Cleveland, O.

ALEX. CLARK.

J. B. HALL.

J. H. KILLERAN,
Marine Surveyor.

A. Clark & Co. VESSEL AND INSURANCE AGENTS,
Tel. No. 892. 55 Main St., BUFFALO, N. Y.

JOHN MITCHELL.

JOHN F. WEDOW.

ALFRED MITCHELL.

MITCHELL & CO.,

Vessel and Insurance Agents,

508, 509 and 510 Perry-Payne Building, CLEVELAND, OHIO
Office Telephone, 787. Residence, John Mitchell, 3508.

C. R. JONES & CO., VESSEL AGENTS,

FIRE AND MARINE INSURANCE.

Nos. 501, 502 and 503 Perry-Payne Bldg., CLEVELAND, O.

ORESTES C. PINNEY,

Lawyer and Proctor in Admiralty.

Rooms 722 and 723 Perry-Payne Bldg.
CLEVELAND, OHIO.

Telephone 2585.

C. W. ELPHICKE.

JAS. A. MYERS.

A. L. FITCH.

C. W. ELPHICKE & CO.

GENERAL INSURANCE AGENTS.

Room 10, No. 8 Sherman St., Chicago, Ill.

PATENTS

QUICKLY SECURED. Trade-marks and Copyrights registered and patent business of every description promptly and skillfully conducted at lowest rates. Inventions introduced, companies formed, and PATENTS SOLD ON COMMISSION. 25 years' experience. Highest references. Send us model, sketch or Photo. of invention, with explanation, and we will report whether patentable or not, free of charge. OUR FEE PAYABLE WHEN PATENT IS ALLOWED. When patent is secured we will conduct its sale for you without extra charge. 32-PAGE HAND-BOOK and list of 200 inventions wanted mailed to inventors free upon request. This is the most complete little patent book published and every inventor should WRITE FOR ONE. H. B. WILLSON & CO. Patent Solicitors, Le Droit Bld'g, WASHINGTON, D. C.

J. J. H. Brown. Edward Smith.
J. B. Rodgers.

BROWN & Co.,
Vessel and Insurance Agents,
202 Main St.,
BUFFALO, N. Y.

White, Johnson & McCaslin,
ATTORNEYS-AT-LAW,
—AND—

Proctors in Admiralty,
26-27 Blackstone Building,
CLEVELAND, - OHIO.

J. T. ROSE.

FRANK B. LAZIER.

ROSE & LAZIER,

Vessel Agents and Brokers,
and Marine Insurance,

16 Board of Trade,
DULUTH, - MINN.

THOS. WILSON,

MANAGING OWNER

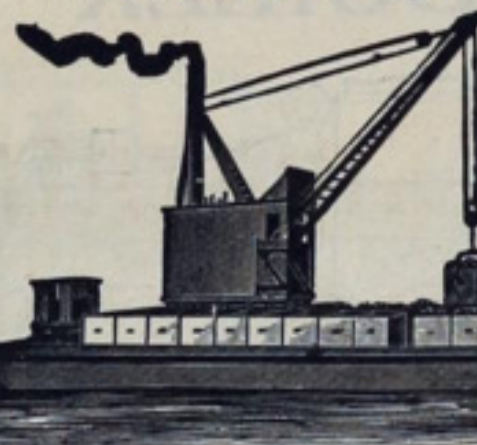
WILSON'S TRANSIT LINE.

Gen. Forwarder.

Freight and Vessel Agent.

CLEVELAND, O.

Pickands, Mather & Co.,



FUEL LIGHTERS

AT BUFFALO,
ERIE,
ASHTABULA
AND CLEVELAND.

At DETOUR, MICH., A FUEL DOCK equipped with
Shute capacity of 600 Tons.
Best Quality PITTSBURGH COAL furnished at any
time during Day or Night.

Western Reserve Building, CLEVELAND, O.

Ohio & Pennsylvania Coal Co.

FUEL DEPARTMENT.
MINERS AND SHIPPERS,

Youghiogeny and Ohio Steam Coals. Steamboats, Tugs, etc., Coaled day or night, DOCKS FOOT WEST RIVER STREET. WHISKEY ISLAND GOVERNMENT PIER and C. & P. R. R. SLIPS. Also STEAM LIGHTER—Equipped with Revolving Derrick and (100) two ton buckets.

Telephone 1608. Office, 130 West River St., CLEVELAND, OHIO.

THE PITTSBURGH AND CHICAGO GAS COAL CO.

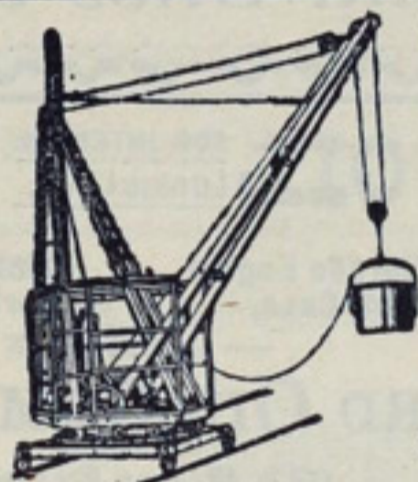
MINERS AND SHIPPERS OF

Pittsburgh and Youghiogeny Coal.

Fuel Docks West Side of Main River, Cleveland, Ohio, just above Main St. Bridge. Latest equipment for rapid fueling of Steamers at all hours, day or night. Fuel Lighter 300 tons capacity; buckets 2½ tons capacity.

Telephone { Office 1888.
Fuel Dock 1590.
Ore Dock, 2413.

J. A. DONALDSON, Agent,
420-421 Perry-Payne Building.



TOLEDO FUEL CO.,

Cambridge, Hocking, Jackson
and Massillon Coal

Wheeled on or put on with DERRICK,
NIGHT OR DAY.

SATISFACTION GUARANTEED.

H. H. WILLIAMS, Manager.

Located on Penn. Dock, TOLEDO, O.
GET OUR PRICES. Phone 1441.

H. A. BARR, PRESIDENT, F. H. VAN CLEVE, SMC. CAPT. GEO. BARTLEY, SUPT.
Escanaba. Escanaba. Escanaba.

ESCANABA TOWING & WRECKING CO., Escanaba, Mich.

Tugs, Lighters, Steam Pumps, Hawsers, Hydraulic Jacks and Diving Appliances always ready.

TUG MONARCH, { Engine Compound, Cylinder 16 and 30 inches diameter, 30 inch-
Stroke, Steam Pressure Allowed, 125 pounds.

TUG DELTA, { Cylinder 20 by 22, Steam Pressure Allowed, 105 pounds.

TUG OWEN, { Cylinder 20 by 20, Steam Pressure Allowed, 104 pounds.

CENTRIFUGAL PUMPS, Seven and Fourteen Inch Suction

H. G. TROUT, KING IRON WORKS,

BUFFALO, N. Y..

MANUFACTURERS OF

TRIPLE EXPANSION,

THREE CYLINDER,

FORE AND AFT

And STEEPLE COMPOUND

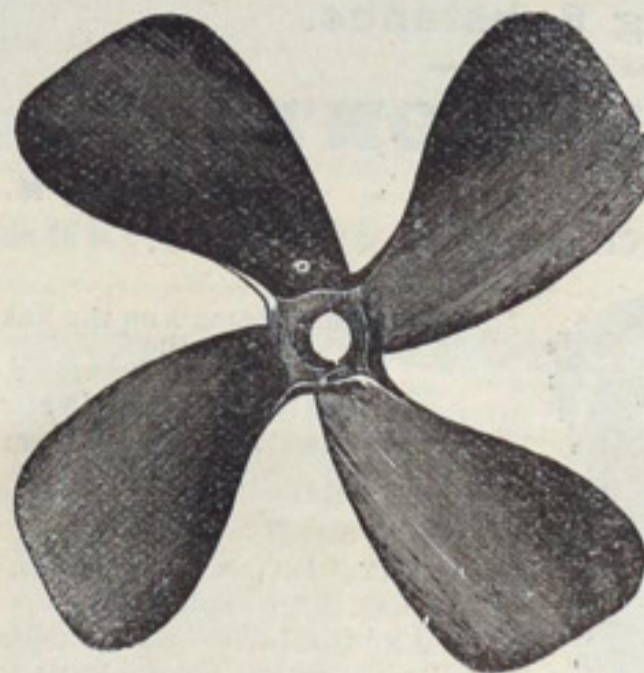
MARINE ENGINES,

High and Low Pressure Engines,

Sectional. Propeller,

Tug and Yacht Wheels.

Cowles Aluminum and Manganese
Bronze Propeller Wheels.



These Wheels are noted for their extra
speed, towing power and propor-
tionate saving of coal.

PRICES QUOTED ON APPLICATION.

A CHART OF THE WHOLE OF GEORGIAN BAY,

The best thing of its kind as yet published, has recently been issued by the British admiralty, and may be had from the MARINE REVIEW, No. 409 Perry-Payne building. Another chart, of a very clear and interesting kind, taking in Lake Huron, Georgian Bay, Lake Erie and connecting channels has also been issued recently by the same authority.

RAPID FUELING DOCKS, DETROIT RIVER.**JAMES GRAHAM & CO.,**

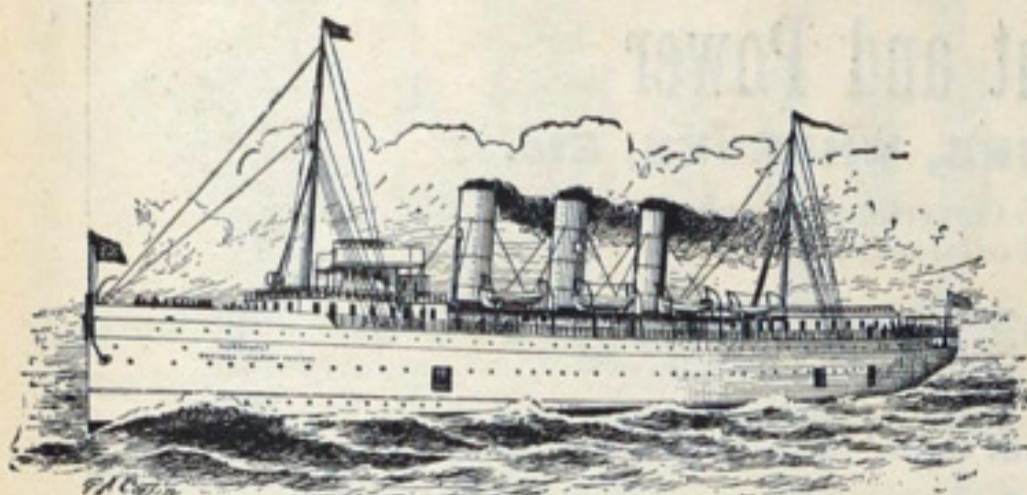
Foot Twenty-first St., Detroit,

Below Routes of Passenger and Car Ferry Lines.

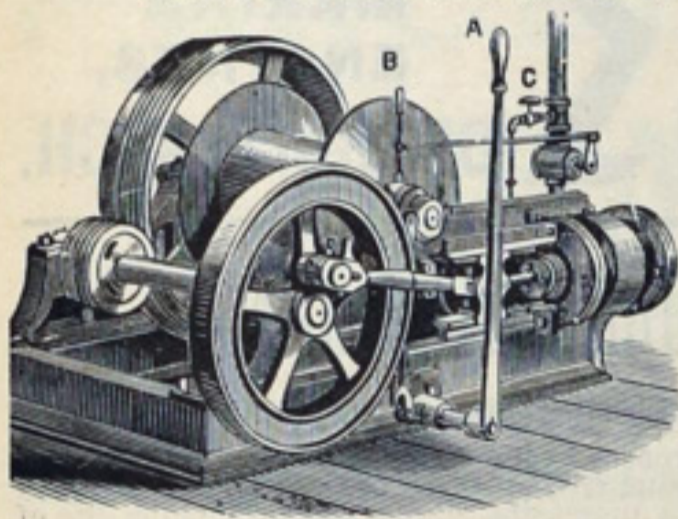
Pockets and Chutes arranged for different types of vessels.

BEST STEAM COAL.

Large Supplies and every effort to give dispatch, day and night. Wide stretch of river for tows, and plenty of water at dock at all times.

**WILLIAMSON BROS.**

Cor. Richmond and York Sts., PHILADELPHIA, PA.

**Hoisting Engines and Ship Steering Engines.**

With either Frictional Spur or Worm Gear of various Patterns to suit all purposes.

Over 150 of the largest and most modern lake steamers have our steerers.

THE W. L. SCOTT CO.

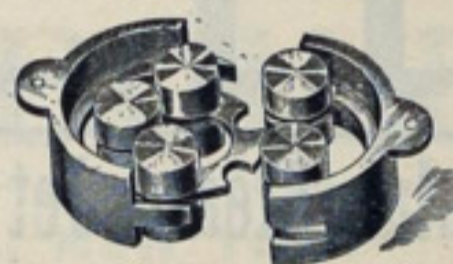
Wholesale Dealers in

Shamokin, Wilkesbarre, and Hazleton-Lehigh

COALS.**Mansfield Steam Coal.**

FUELING VESSELS a specialty, either from dock or steam scow Mansfield, capacity 300 tons, in buckets, which gives quick dispatch. Boats coaled day or night. Docks lighted with electricity and equipped with steam derricks.

Fueling Office at Canal Dock, ERIE, PA.

FERRALL'S PATENT**Long Bearing Self-Adjusting 5 Roll Sheave**

Has no rivets in its construction, therefore is made stronger, having an interior separator to prevent the rolls from touching each other, and an interior rail to guide the rolls.

**BAGNALL-LOUD BLOCK CO.**

162 Commercial Street,

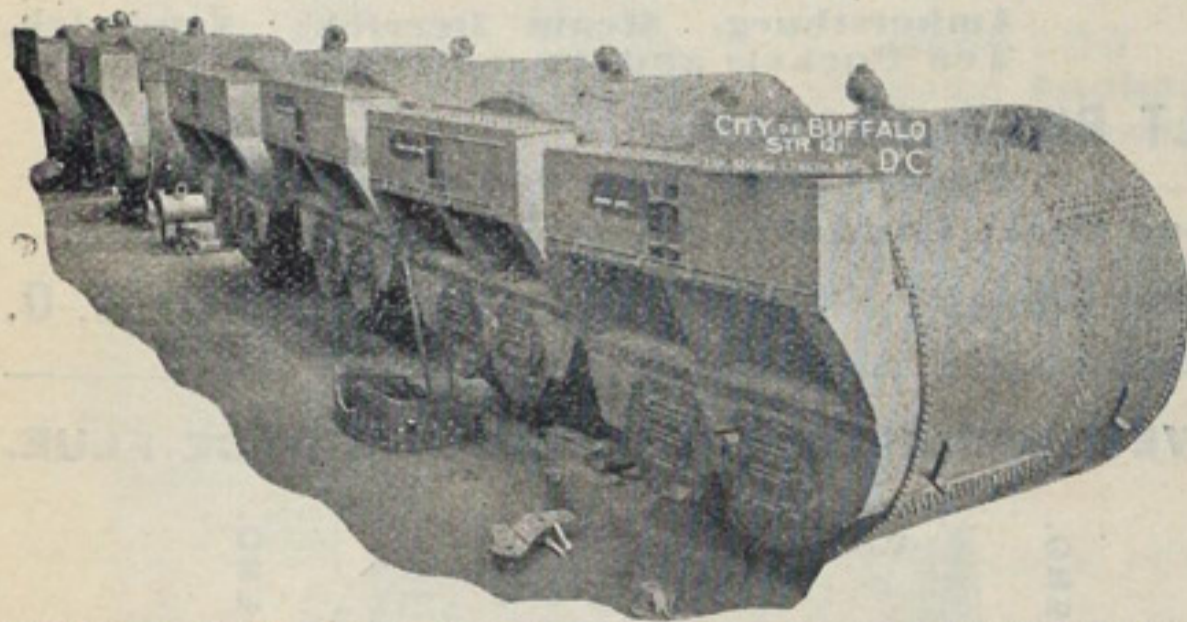
BOSTON, MASS.

**The Rochester & Pittsburgh Coal & Iron Co.
Reynoldsville Coal.****STEAMBOAT FUEL DOCK.** Blackwell Canal at Michigan St. Bridge.
1400 Feet Dock Frontage.

Steam Elevator and 4 Steam Derricks. Steam Fuel Scow, Capacity 550 Tons. Boats Coaled Day or Night.

OFFICE : 694 Elliott Square Bldg., BUFFALO, N.Y.**TELEPHONES :**

Ellicott Square Bldg., Seneca 371 A. Dock, Seneca 371 D.

WM. H. HAZEN, Dock Superintendent.**Air is Cheap—Cheaper than Dirt!****FUEL IS DEAR—VERY DEAR!****USE AIR AND SAVE FUEL!**

Six Boilers with Howden Hot Draft appliances now in Side-Wheel Steamer City of Buffalo. Dimensions of each boiler—12 ft. 6 in. diameter by 12 ft. length.

ECONOMY in operating expenses on Lake Ships must come from reduced coal bills. No great saving can be made in labor cost, and provisions are already low. But fuel bills can be lowered and cheap coal used to advantage by adopting Modern Methods of making steam at low cost.

No manufacturer of pig iron would to-day think of running his furnace without a hot blast. Competition would not permit it. This same competition demands advanced practice in the operation of ships. The same principle is applied in the

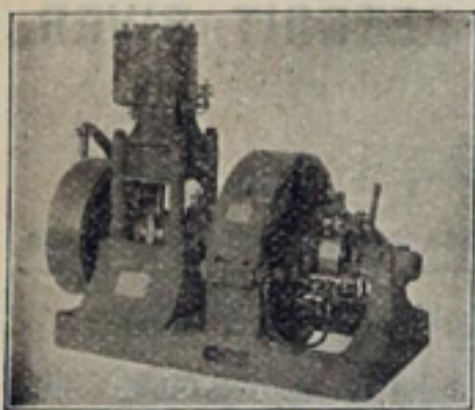
HOWDEN HOT DRAFT

Now in use on Lake Steamers aggregating over 40,000 Horse Power.

CAN BE APPLIED TO OLD SHIPS AS WELL AS NEW ONES.

No complicated machinery. Cool engine rooms and cool fire holds. Estimates readily furnished for application of this draft to any steamer.

DRY DOCK ENGINE WORKS, DETROIT, MICH.



Complete Electric Plants for Light and Power

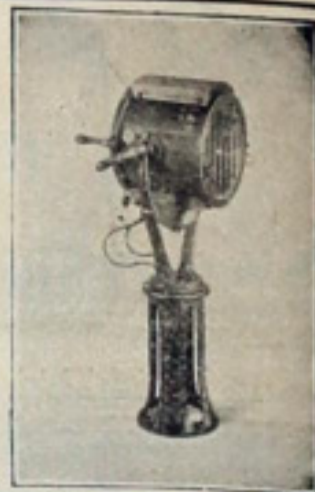
On STEAMSHIPS, WHALEBACKS, YACHTS, DOCKS, WHARVES, Etc.

Our system is complete in every detail. All our appliances are made to Governmental and Insurance requirements and are perfect. Write for prices and catalogues.

General Electric Company.

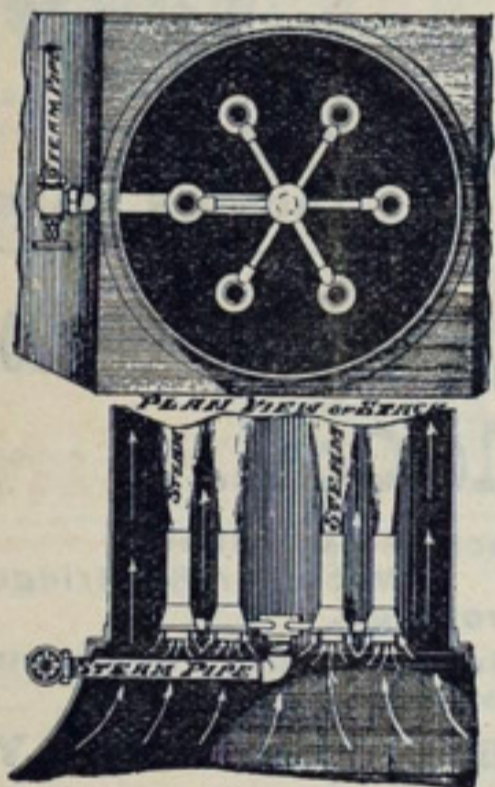
SALES OFFICES

Schenectady, N. Y. Chicago, Ill. Detroit, Mich. Buffalo, N. Y. Columbus, O.
Boston, Mass. Philadelphia, Pa. Baltimore, Md. Portland, Ore. San Francisco, Cal.
New York, N. Y. New Orleans, La.



FRONTIER IRON WORKS

MARINE ENGINES, DETROIT, MICH.



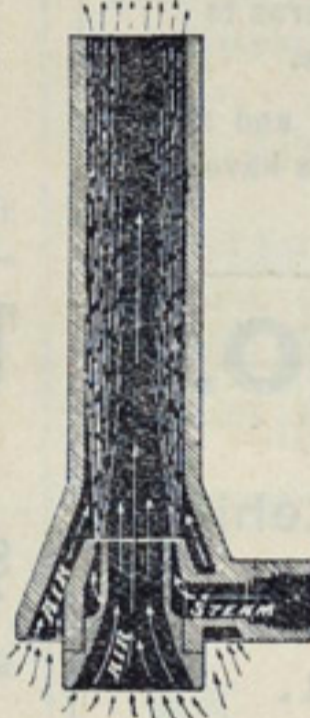
SECTION VIEW OF STACK SHOWING SET IN OPERATION

The Annular Steam Jet

For Smoke Stacks of Steam Boilers.

Acknowledged as the most powerful and economical jet on the market, giving results equal to forced draft with fan. Works well at all steam pressures.

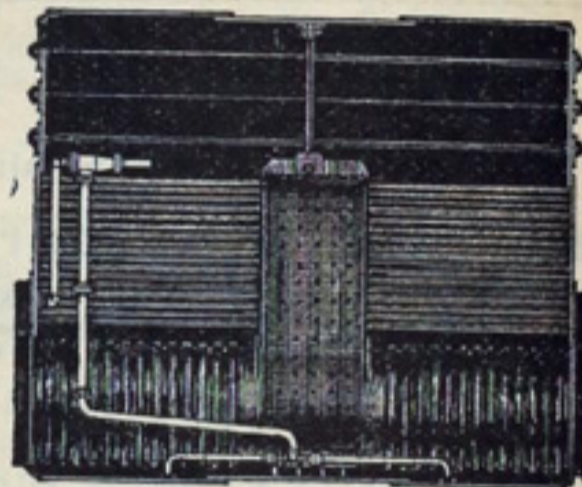
In use on the fast Sound Steamer City of Lowell and famous Delaware River Strs. City of Chester and Brandywine, together with several Cuban and Mexican Strs. Also many Steamships, Side Wheel and Propeller, Lake, Bay and River Strs. Cut on the right shows sectional view of castings, which are spaced at equal distances throughout the stack, making an equal subdivision of its area. These castings are attached to pipes radiating from a central casting attached to steam pipe, as shown on the left. Steam is supplied through these pipes to each casting discharging through an annular opening, as shown by dotted lines, causing a current of air and gases to flow through the central and outside air passages, and discharge at a high velocity up the stack, as shown by arrows. Prompt delivery of orders guaranteed.



The Equilibrium Circulator

For Heating and Circulating the Water in Steam Boilers.

Equalizes expansion and increases evaporation, thereby saving coal and preventing leaks, thus saving cost of repairs. Prevents foaming or priming and pitting, thus increasing safety and prolonging life of boiler. In use on the International Nav'n Co's Steamers Paris, Southwark, Pennsylvania and Illinois; Steam Ships Gloucester and Howard of Merch'ts and Miners Line; Sound Steamers City of Lowell and Richard Peck; fishing steamer Al. Foster; Delaware River Steamers City of Chester and Brandywine; and many steam yachts and tug boats, giving remarkable results. Used by Harlan & Hollingsworth Co., Bath Iron Works, Maryland Steel Co., and others. Castings carried in stock for prompt delivery.



Circulating Apparatus in Boilers of the Ocean Greyhound Str. Paris.

Address **H. BLOOMSBURG & CO.,**

Main Office, Newport News, Va.

Branch Office, 818 Adams St., Wilmington, Del.

THE Bethlehem Iron Company

WORKS and PRINCIPAL OFFICE:

SOUTH BETHLEHEM, PENNA.

Steel Forgings of all descriptions

For **Marine Engines**

Fluid Compressed, Hollow, Hydraulic Forged and Annealed Forgings a Specialty.

NEW YORK OFFICE, - - 100 Broadway.

PHILADELPHIA OFFICE, - 421 Chestnut St.

CHICAGO OFFICE, - - Marquette Bldg.

The United States Standard Register of Shipping.

Providing the only Standard Classification based on Construction Rules Designed for Lake Vessels.
Classed Vessels Receive the Lowest Rates of Insurance.

SURVEYORS.

SINCLAIR STUART, Surveyor of Iron and Steel Construction and Engineer Surveyor.

for District comprising Lakes Superior, Michigan and Huron and Lake Erie, as far East as, and including Cleveland, O.

EDWARD CASKIN, Potter Building, Main Street, Buffalo, N. Y., Surveyor for District comprising Lake Ontario and Lake Erie, as far West as, but not including Cleveland, O.

Application for survey of vessels and subscriptions to Register Book will be received by the surveyors or at the office of

The United States Standard Steamship Owners', Builders' & Underwriters' Ass'n., Ltd.
Post Building, 16 and 18 Exchange Place, NEW YORK.

Cuddy-Mullen Coal Co. Lake Shippers of Steam Coal.

FUELING DEPARTMENT FACILITIES:

CLEVELAND HARBOR—

Car Dumper; Eight Pockets; Three Steam Derricks; Lighter.

DETROIT RIVER BRANCH—

Amherstburg, Steam Derricks; Sandwich, Ten Pockets and Two Steam Derricks.

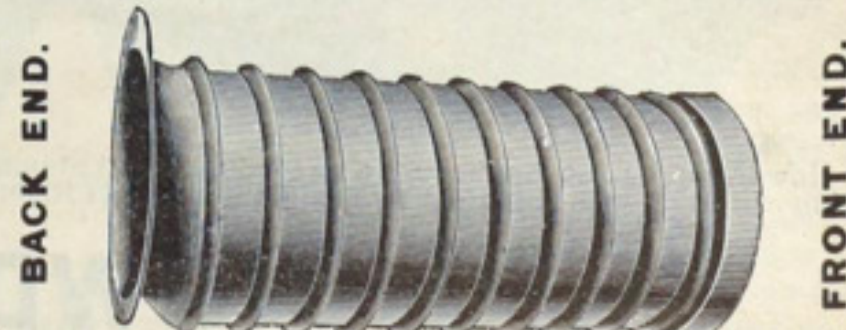
SAULT RIVER BRANCH—

Pocket Dock now under construction.

Good Coal; Courteous Attention; Quick Dispatch.

General Offices: Perry-Payne Bldg., Cleveland, O.

PURVES' RIBBED STEEL BOILER FURNACE FLUE.



With this style of Furnace Flue, the rivets at the "back end" are out of the line of fire, and all that has to be done to remove it is to cut out the rivets at the ends and slip it through the front; and to replace it, simply to slip it back in its place and rivet up the ends extra with it disturbing any other part of the boiler. No smith work is required to fit it in a boiler or to refit it when replaced. It is ready for use as it comes from the manufacturers. This style of Flue has been in use six years without a single complaint.

Over 16,000 of Purves' Ribbed Steel Boiler Furnace Flues in successful use in Marine Boilers.

ELLIS & EAVES SYSTEM OF INDUCED OR SUCTION DRAFT.
CHARLES W. WHITNEY,
Sole Agent for the United States and Canada,
Manhattan Life Building, 64, 66 and 68 Broadway, New York.

S. F. HODGE & CO.

MARINE ENGINES,
PROPELLER WHEELS,
DECK HOISTERS,
MARINE REPAIRS.
320 ATWATER STREET,
DETROIT, MICH.

THE BABCOCK & WILCOX CO. FORGED STEEL WATER-TUBE MARINE BOILER,

29 CORTLANDT ST., NEW YORK.

Boilers sold to United States Merchant Marine and Yachts - - - - - 16,500 H. P.
Boilers sold to United States Navy - - - - - 7,500 "
The only Water-tube Boiler in the British Merchant Marine 15,500 "

BAR IRON THE BOURNE-FULLER CO. PIG IRON CLEVELAND, O.

SHIP PLATES, BOILER PLATES,
ANGLES, BEAMS, CHANNELS, BARS,
BOAT SPIKES, CLINCH RINGS,

SALES AGENTS:

THE CAMBRIA IRON CO.

Mfrs. of Open Hearth and Bessemer Steel.

De Grauw, Aymar & Co.,
34-35 South Street,
NEW YORK, N. Y.



Sole Selling Agents
in the
United States
for

**TYZACK'S
STOCKLESS ANCHORS**

Over 100
of these Anchors
on Lake Vessels.

Steamboat Fuel at Ashtabula. Large Supplies of Best Quality.

Lighter

Carrying
Different
Grades
at all
Times.



Fuel scow with elevators
and discharging spouts.
Storage of 650 tons. Dis-
charges 150 tons an hour
into steamers while un-
loading cargo.

M. A. HANNA & CO.,

Main Office, Perry-Payne Bldg., Cleveland. **Miners and Shippers.**

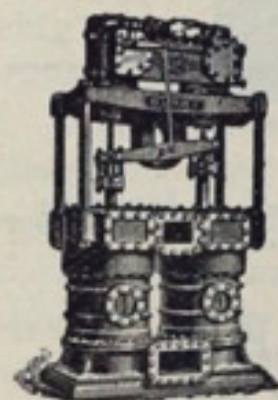
THE GEO. F. BLAKE MFG. CO.

BUILDERS OF

MARINE PUMPS

Single and Duplex Pumps for Boiler Feed,
Fire or Bilge Service—Vertical and Horizontal.
Vertical and Horizontal Pumps, Air Pumps
for Surface and Jet Condensers.

95 and 97 Liberty St., NEW YORK.



AIR PUMP ON
U.S. GRUBER NEW YORK.

PROJECTORS!

10 MILLION TO

100 MILLION

CANDLE POWER.

The only successful commercial light

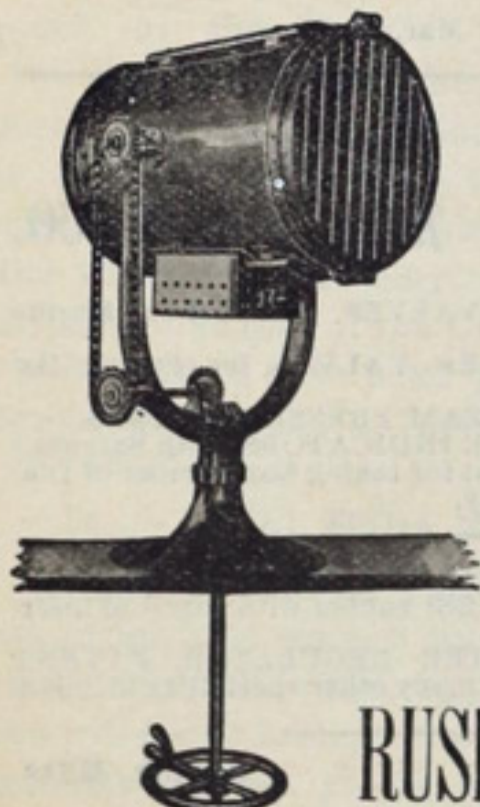
Adopted and endorsed by leading
steamship lines and builders.

Have Replaced All Other Makes.

CATALOG NOW READY.

RUSHMORE DYNAMO WORKS,

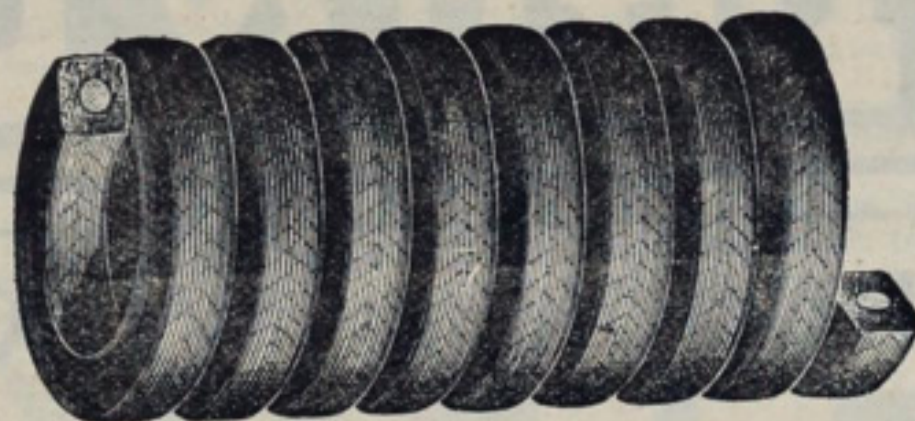
JERSEY CITY, N. J.



Type D. Pilot House.

"HONEST JOHN," 193-195 Bank St., CLEVELAND, O.

MADE BOTH
STRAIGHT
AND SPIRAL.



PUT UP
IN
BOXES.

HYDRAULIC RAINBOW CORE PACKING.

WRITE US FOR TESTIMONIALS.

16-24 Woodward Avenue,
DETROIT, MICH.

PEERLESS RUBBER MFG. CO.,
16 Warren Street,
NEW YORK.

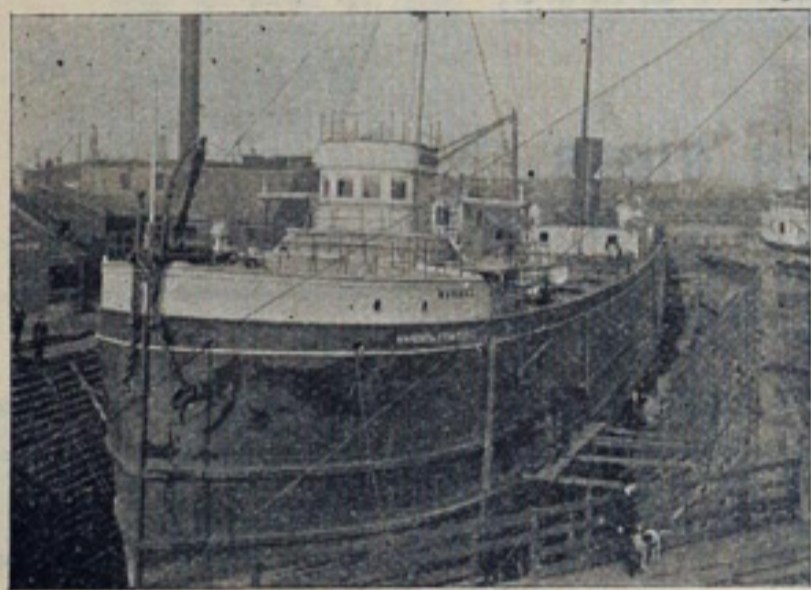
202-210 So. Water St.,
CHICAGO, ILL.

STERLING, WELCH & CO.

12 and 14 Euclid Ave., CLEVELAND, O.

BOAT FURNISHING A SPECIALTY.
CARPETS, OIL CLOTHS,
CURTAINS, &c., &c.,
SUPPLIED AT WHOLESALE RATES.

The Cleveland Dry Dock Co.



148 Elm St.,
Cleveland, O.
Telephone 1616.
Resid. Phone 3634.

REPAIRING
A SPECIALTY.

Dimensions of Dock:
Lth. over all, 360 ft.
Lth. on blocks, 340 ft.
Width of gate, 50 ft.
Depth over sill, 20 ft.

Capt. W. W. BROWN,
Sec'y & Mgr.

C
O
A
L



C
O
A
L

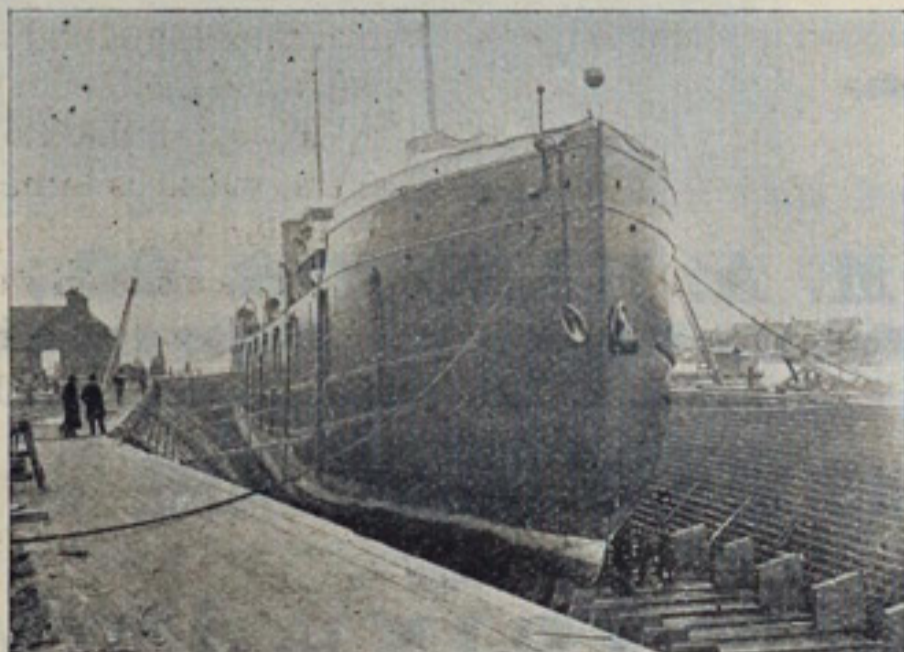
AMERICAN STEEL BARGE CO.

STEEL and METAL SHIPS

Of all classes built on the Shortest Possible Notice at our yards at

West Superior, Wis., and also at Everett, Wash.

Plates &
Material
Always
on hand
to Re-
pair all
kinds of
Metal
Ships in
Shortest
Time.



Best
Quality
of Oak
instock
for Re-
pairing
Wooden
Vessels
of all
Classes.

SIZE OF DOCK.

Length, extreme.....537 feet.	Entrance, Top.....55 feet 9 in
Breadth, Top.....90 " 4 in.	Entrance, Bottom.....50 "
Breadth, Bottom.....52 "	Depth over Sills.....18 "

LARGEST DRY DOCK ON THE LAKES.

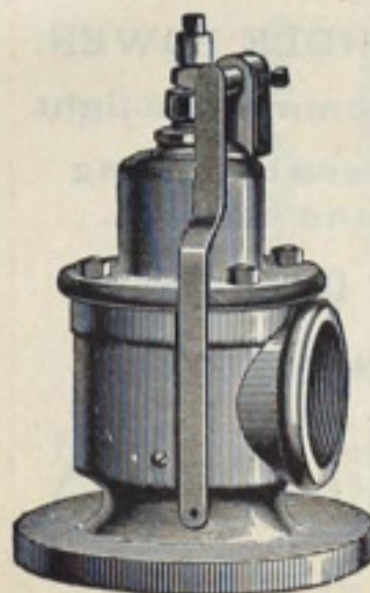
Prices for Repairs and Docking same as at lower lake ports

SUPERIOR, WIS.

A number of Propellor Wheels in stock at Dry Dock.

U. S. ENGINEER OFFICE, Hickox
Building, 185 Euclid Ave., Cleve-
land, O., March 1, 1897. Sealed proposals for
repairing west breakwater at Cleveland Harbor,
Ohio, under continuous contract, will be re-
ceived here until 2 o'clock P. M., Standard
time, Friday, April 2, 1897, and then publicly
opened. Information furnished on application
to JARED A. SMITH, Col., Engrs.
Mar. 18, 25.

CROSBY STEAM GAGE AND VALVE CO.



CROSBY POP SAFETY VALVES. Locomotive, Marine
and Stationery.
CROSBY WATER RELIEF VALVES, for Pumps, Hy-
drants, etc.
CROSBY IMPROVED STEAM PRESSURE GAGES.
CROSBY STEAM ENGINE INDICATORS, with Sargent's
Electrical Attachment for taking any number of Dia-
grams simultaneously.

The Original SINGLE BELL CHIME WHISTLES.
BRANDEN PUMP VALVES; rubber with wire-coil inser-
tion.
BOSWORTH FEED-WATER REGULATOR, PATENT
GAGE TESTER, and many other specialties in Steam
Lines.

Main Office and Works: Boston Mass.

Stores: Boston, New York, Chicago, and London, Eng.

WE WILL REPAIR YOUR STEAM FITTINGS PROMPTLY.